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RUN

THE COMMODORE 64/128 USER'S GUIDE

October 1988
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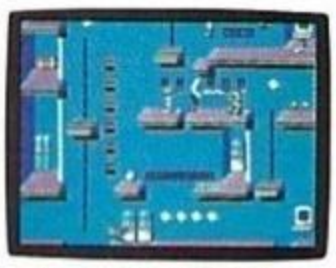
Hold it. What's this? Human-seeking suicide robots? An evil mastermind bent on world annihilation?

There are 8 office towers to search, each with its own theme and level of difficulty.



Of course, Elvin's floor plans are almost as complicated as his global plans.

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The trick here is to collect the secret code numbers that will ultimately allow you to access Elvin's stronghold. And waste him before he wastes the world.

There are over 50 rooms to search for codes. Careful. The floors and catwalks in this place end a little abruptly. And of course, they're guarded by those pesky bots. But you've got an MIA9366B pocket computer to help you crack the security code. A working tape player to play music clues. And a map to show which towers you have or have not searched.

Go then. Elvin is preparing to launch his missile attack in less than ten hours. You must stop him. Or the world will be terminally late for dinner tonight.

IMPOSSIBLE MISSION II

BY EPYX

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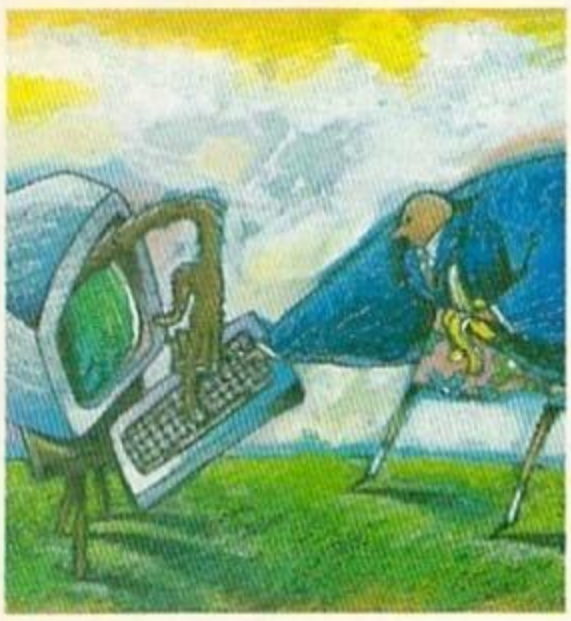

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RUNNING RUMINATIONS

I KNEW I SHOULDN'T have opened it, but there it was on my desk, summoning me to take a peek inside. My name, written in large red letters, was emblazoned on the envelope. What follows is an unedited letter from Silvia Dos, a certified technophobe.

Dear Editor,

I want to sue for breach of promise. Like a glib politician at a Democratic or Republican convention, the personal computer world is long on promises but short on delivery. Let me explain.

The computer industry paints a picture of smooth-running, efficient machines that perform wondrous tasks at the touch of a key. This is the so-called "promise" of computing. Ha! In reality, computerists run the risk of making simple tasks much more complicated than they need to be.

Sometimes it takes a while to realize the promise of computing.

For me, computerdom is a nightmare world of disk crashes, computer theft, human error, software copying, contaminated/lost/destroyed files, computer illiteracy, clones and error handling.

Even the simple act of turning on my equipment can be traumatic. Is it monitor first, disk drive second, computer third, or the other way around?

I can never remember whether I'm uploading or downloading files on the BBS. And does the temperature in the room determine whether I should perform a warm boot or a cold boot?

I spend so much time worrying if my software is "compatible" with my hardware—it's enough to make me pack up my floppies and head for the sanity of a world before computers.

The computer world can be an intimidating environment populated by pirates, mavericks, computer freaks, computer addicts and mischievous programmers who can strike with an epidemic of viruses at any moment.

The industry aspires to make their products as easy to use as the average household appliance. No thanks. They obviously never had to grapple with my VCR or microwave oven.

In sum, Mr. Brisson, the personal computer world is a bewildering, overwhelming place—not a leading-edge technological paradise. I've been hoodwinked by the promise of computing, which states that my computer can help solve all my problems (quit smoking, lose weight, improve my memory, become a better golfer).

There's something missing in my life. I have yet to experience the utility, power and convenience of computing without the hassle. What went wrong?

Dear Ms. Dos,

Since I received your letter, I'm glad to hear that you have undergone extensive psychiatric sessions at computer camp and are back in the mainstream of computerdom with a more positive outlook. You may be surprised to learn that your opinions are probably shared by more than one new computer user.

If you hopped onto the computer bandwagon looking for a cure-all, then you're in for a bumpy ride. At its best, a computer is an effective tool that can do some things extremely well, as millions of people of varying interests and abilities have discovered.

Despite the unpredictability and uncertainty, the promise of computing still beckons. Like the American dream, it can be elusive, but attaining the goal is worth the struggle.

Regards,

Dennis Brisson

Dennis Brisson
Editor-in-Chief

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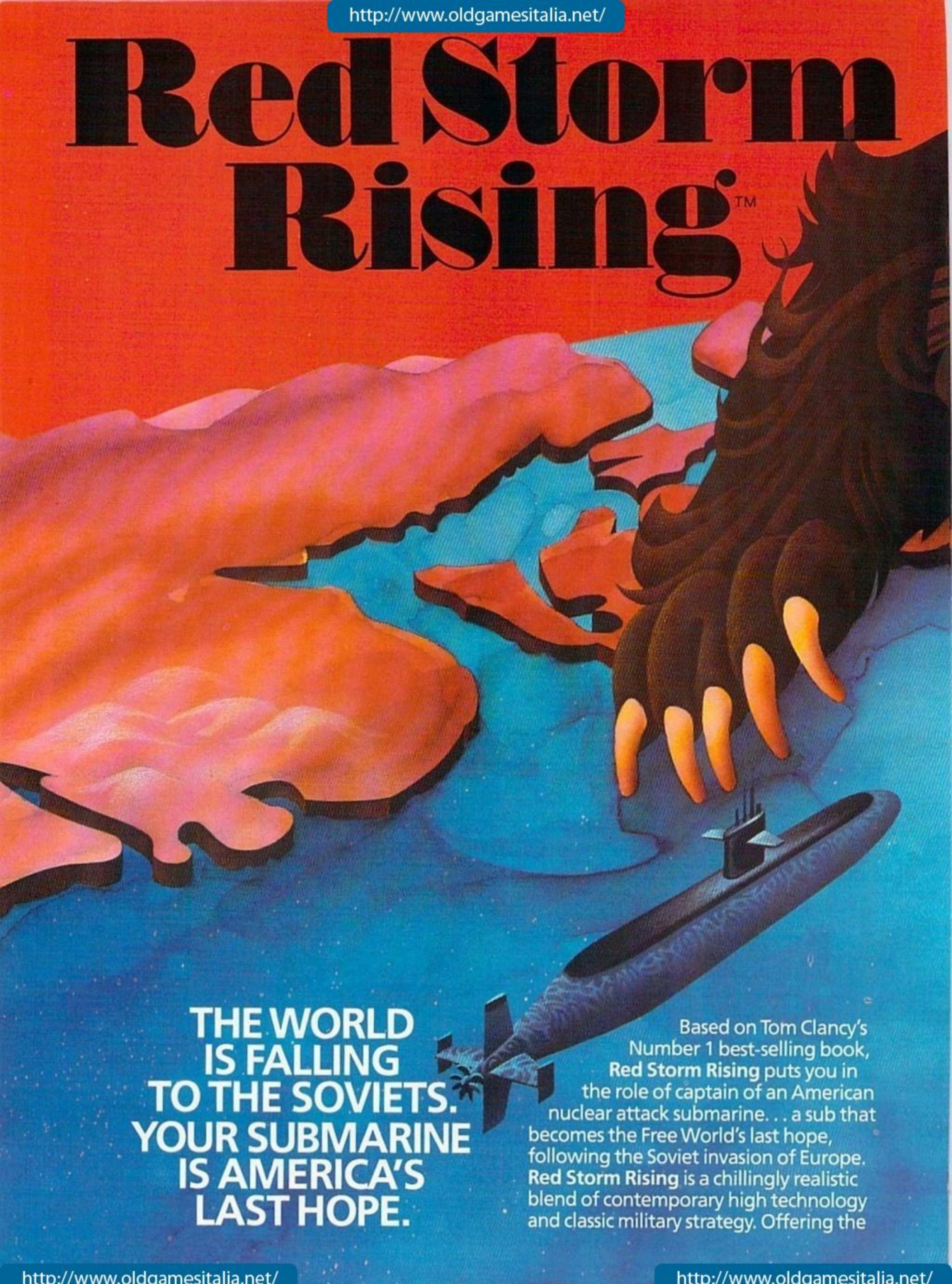

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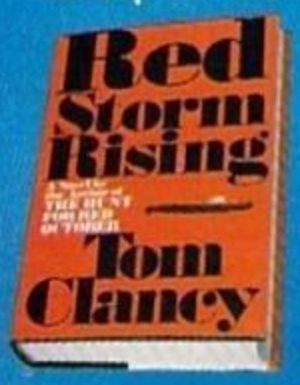

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MAGIC

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Compiled by TIM WALSH

$4D2 SCIENTIFIC NOTATION ELIMINATION

Get rid of scientific notation when performing multiplication on large numbers by using my program, Scientific Notation Elimination. Without resorting to scientific notation, it produces an answer after multiplying integers up to nine digits long.

```
Ø REM MULTIPLIES WITHOUT NOTATION - WILLIA
  M B BAILEY                          :REM*211
1Ø PRINT CHR$(147)"CANCELS SCIENTIFIC NOTA
  TION"                               :REM*65
2Ø DIM C(19),C$(19):M=Ø:N=Ø           :REM*99
3Ø INPUT"ENTER 1ST NUMBER";A$         :REM*15Ø
4Ø INPUT"ENTER 2ND NUMBER";B$:LA=LEN(A$):L
  B=LEN(B$)                           :REM*2Ø5
5Ø IF LEN(A$)>9 OR LEN(B$)>9THEN24Ø
                                      :REM*152
6Ø VA=VAL(A$):VB=VAL(B$):P=19-(LA+LB)
                                      :REM*116
7Ø IF VA<>INT(VA)OR VB<>INT(VB)THEN24Ø
                                      :REM*16Ø
8Ø FOR I=1 TO LA:A(I)=VAL(MID$(A$,I,1)):NE
  XT                                   :REM*26
9Ø FOR I=1 TO LB:B(I)=VAL(MID$(B$,I,1)):NE
  XT                                  :REM*2Ø6
1ØØ FOR I=18 TO P STEP-1:Q=I          :REM*211
11Ø FOR J=LA TO 1 STEP-1              :REM*1Ø6
12Ø C(Q)=C(Q)+A(LA-N)*B(LB-M):Q=(Q-1)
                                       :REM*6
13Ø N=N+1:NEXT                        :REM*174
14Ø M=M+1:N=Ø:IF M<=LB THEN NEXT      :REM*182
15Ø FOR I=18 TO P STEP-1:C(I)=C(I)+R
                                      :REM*177
16Ø R=INT(C(I)/1Ø):C(I)=C(I)-1Ø*INT(C(I)/1 ►
```

TRICK OF THE MONTH

$4D3 CHARACTER FADE/RESTORE 64

Many commercial games use a technique, called "fizzle," that makes screen images fade out and fade in. Until now, using this technique in your own programs was well beyond the reach of everyone but highly skilled programmers.

Now, using the C-64's character set and the Character Fader 64 program, anyone can do it. Type in the program, using *RUN*'s Checksum, and save it. Run the program and treat yourself to a performance that rivals those found in most commercial programs.

When you first enter the SYS 49152 command, the screen fades, and entering it the second time returns the screen. To change the speed of fade out/fade in, enter POKE 49240, followed by a comma and a number from 0 (fastest) to 255 (slowest). Adding this technique to your own programs will create some stunning displays.

```
Ø REM 64 LETTER FADER - JEFF MARTIN:REM*35
1Ø FORI=49152 TO 4942Ø:READD:POKEI,D:C=C+D
  :NEXTI                              :REM*59
2Ø IF C<> 31597 THENPRINT"ERROR IN DATA...
  ":END                               :REM*168
3Ø FORT=1TO2Ø:PRINT" LETTER FADER IS ACTIV
  ATED":SYS49152:NEXT                 :REM*219
4Ø DATA 173,24,2Ø8,41,8,2Ø8,62,32,27,192,2
  Ø8,4Ø,16Ø,Ø,132,25Ø,132,252         :REM*212
5Ø DATA 169,2Ø8,133,253,169,48,133,251,96,
  32,12,192,133,52,133,56,173         :REM*6Ø
6Ø DATA 24,2Ø8,41,24Ø,9,12,141,24,2Ø8,14Ø,
  14,22Ø,169,51,133,1,96,177          :REM*155
7Ø DATA 252,145,25Ø,2ØØ,2Ø8,249,23Ø,251,23
  Ø,253,165,253,2Ø1,224,2Ø8,239       :REM*234
8Ø DATA 32,44,192,32,12,192,16Ø,Ø,169,192,
  133,255,238,11,193,173,11,193       :REM*237
9Ø DATA 2Ø1,1,2Ø8,246,169,255,141,11,193,1
  66,255,169,248,133,254,173,12       :REM*226
1ØØ DATA 193,24Ø,5,32,171,192,8Ø,3,32,187,
  192,232,2ØØ,24Ø,6,23Ø,254,2Ø8       :REM*23
11Ø DATA 235,24Ø,212,23Ø,251,23Ø,253,165,2
  53,2Ø1,21Ø,2Ø8,24Ø,32,12,192        :REM*228
12Ø DATA 24,165,255,1Ø5,8,133,255,2Ø8,19Ø,
  173,12,193,24Ø,5,142,12,193         :REM*196
13Ø DATA 2Ø8,4,232,142,12,193,169,55,133,1
  ,169,1,141,14,22Ø,96,177,252        :REM*1Ø7
14Ø DATA 61,11,192,141,13,193,177,25Ø,13,1
  3,193,145,25Ø,96,189,11,192,73      :REM*37
15Ø DATA 255,141,13,193,177,25Ø,45,13,193,
  145,25Ø,96,16,4,4,1,1,64,128        :REM*13
16Ø DATA 32,64,64,64,2,4,8,64,1,128,32,128
  ,16,128,16,8,128,4,128,32,64        :REM*185
17Ø DATA 32,128,1,2,8,8,8,128,64,32,2,8,32
  ,1,1,32,16,1,4,16,1,16,2,8,2,2:REM*181
18Ø DATA 32,4,2,2,16,4,8,4,16,64,255,Ø
                                      :REM*18Ø
```

—JEFF A. MARTIN, ROSEVILLE, CA

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```
    Ø)                                          :REM*33
17Ø NEXT                                        :REM*45
18Ø FOR I=PTO18:C$(I)=STR$(C(I)):NEXT
                                                :REM*63
19Ø IF C$(P)=" Ø"THEN P=P+1                     :REM*193
2ØØ FOR I=P TO 18:T$=T$+RIGHT$(C$(I),1):NE
    XT                                          :REM*77
21Ø PRINT:PRINT"{3 SPACEs}"T$:PRINT
                                                :REM*157
22Ø PRINT" PRESS {LEFT ARROW} TO REPEAT
                                                :REM*56
23Ø GET A$:IF A$<>"{LEFT ARROW}"THEN23Ø
                                                :REM*176
24Ø CLR:GOTO1Ø                                  :REM*74
```

—William B. Bailey, Sacramento, CA

$4D4 The Final Grade

In keeping with the educational theme of this issue, here's a useful 64/128 program for students from elementary to undergraduate school to help them determine their final grades. Type in Last Grade 64/128 and save it to disk, and run it in either 64 or 128 mode. It determines your final grade based on the results of all your test scores. It also tells you the score you need on your final exam in order to achieve a desired final grade.

If your teacher or instructor tells you that all tests have the same weight in determining the final grade, enter 100 at the first prompt. Then enter the scores from all previous tests in that class. Make sure that the missing grade percentage is configured last. After entering all the percentages, the program displays a list of potential last-grade percentages corresponding to the final average. Also, note that variables that can affect your final grade, such as attendance and class participation, are not reflected in this program.

```
Ø REM C-128/C-64 LAST GRADE - ANDREW SENFT
                                                :REM*159
1Ø POKE 5328Ø,Ø:POKE 53281,Ø:PRINTCHR$(147
   )"LAST GRADE                                 :REM*222
2Ø PRINT"{CRSR DN}PRESS RETURN WHEN FINSIH
   ED"                                          :REM*134
3Ø P%=Ø:PRINT"{CRSR DN}GRADE SECTION PERCE
   NTAGE FROM";1ØØ-TP%;"{CRSR LF}%";:INPUT
    P%                                          :REM*151
4Ø IFP%+TP%>1ØØTHENPRINT"{CRSR DN}TOTAL EX
   CEEDS 1ØØ% BY";(TP%+P%)-1ØØ:GOTO3Ø
                                                :REM*238
5Ø TP%=TP%+P%:IFP%=ØTHENLP=1ØØ-TP%:GOTO 12
   Ø                                            :REM*15
6Ø GC%=Ø:GA%=Ø                                  :REM*194
7Ø G$="":INPUT"GRADE IN %";G$:IFG$<>""THEN
   GA%=GA%+VAL(G$):GC%=GC%+1:GOTO7Ø
                                                :REM*1ØØ
8Ø IF GC%=ØTHEN GC%=1                           :REM*243
9Ø PRINT"AVERAGE= ";GA%/GC%                     :REM*13Ø
1ØØ IFTP%<1ØØTHENA=A+(GA%/GC%)*P%/1ØØ:GOTO
    3Ø                                          :REM*23Ø
11Ø A=A+(GA%/(GC%+1))*P%/1ØØ:LP=P%/(GC%+1)
                                                :REM*23
12Ø PRINT"{2 CRSR DNs}{CRSR LF}";LP;"{CRSR
    LF}% LEFT TO COMPUTE LAST GRADE":GOSU
   B18Ø                                         :REM*43
13Ø FORD= 1ØØ TO 1STEP-2Ø:PRINT"{SHFT CLR}
   NEED ","TO RECEIVE"                          :REM*1Ø6
14Ø PRINT"----","----------"                     :REM*28
15Ø FORC= D TO D-2Ø STEP-1:A%=(A+(LP*C/1ØØ
   )+.5):PRINTC,A%;                             :REM*135
16Ø IF AF%=ØTHEN IFA%=>CTHENAF%=1:PRINT"CU
   RRENT AVERAGE";                              :REM*171
17Ø PRINT:NEXT:GOSUB18Ø:NEXT:AF%=Ø:GOTO13Ø
                                                :REM*138
18Ø PRINT"{CRSR DN}PRESS A KEY TO CONTINUE
   {CRSR UP}"                                   :REM*234
19Ø GETA$:IFA$=""THEN 19Ø                       :REM*157
2ØØ RETURN                                      :REM*87
```

—Andrew Senft, Auburn, NY

$4D5 Slowing the Frequency

We've received letters from *RUN* readers such as Juan Braghini of Concordia, Argentina, and Giorgio Grassi of Parma, Italy, asking for a way to change the C-64 and C-128 internal clocks to operate on the South American and European 50 Hz electrical current. In response, I've written utilities for both the C-64 and the C-128 that slow the CIA #1 and CIA #2 clocks to 50 Hz. This permits Commodore owners in these countries to use programs that utilize internal clocks, such as Notepad 64/128, Time Keeper 64/128 and, of course, Tick Tock 128.

Before using any Commodore program on overseas electrical currents, run the appropriate version of this utility. Anyone taking his or her Commodore abroad would also be wise to take along these two clock-conversion programs.

```
Ø REM C-64 5Ø HZ WEDGE - BOB KODADEK
                                                :REM*133
1Ø SA=3Ø4:VEC=768:REM 'SA' IS RELOCATABLE
                                                :REM*98
2Ø FORI=Ø TO 1Ø:READBY:POKE SA+I,BY:NEXT
                                                :REM*229
3Ø POKE VEC,SA-INT(SA/256)*256                  :REM*132
4Ø POKE VEC+1,INT(SA/256)                       :REM*12Ø
5Ø DATA 173,14,221,9,128,141,14,221,76,139
   ,227                                         :REM*58


Ø REM C-128 5Ø HZ WEDGE - BOB KODADEK
                                                :REM*52
1Ø SA=2Ø48:VC=768                               :REM*247
2Ø FORI=Ø TO 18:READB$:POKE SA+I,DEC(B$):N
   EXT                                          :REM*187
3Ø POKE VEC,SA-INT(SA/256)*256                  :REM*132
4Ø POKE VEC+1,INT(SA/256)                       :REM*12Ø
5Ø DATA AD,Ø,FF,29,FE,8D,Ø,FF,AD,E,DD,9,8Ø
   ,8D,E,DD,4C,3F,4D                            :REM*14Ø
```

—Bob Kodadek, Aston, PA

$4D6 Lengthy DIP Switches

I've placed this DIP tip on a local BBS and have gotten many thank-yous in return. I hope *RUN* readers will find it equally helpful. To make the DIP switches on the rear of

Continued on p. 88.

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News and New Products

Games are hot, and the Summer CES was sizzling with new releases for the C-64.

Compiled by HAROLD R. BJORNSEN

Another Fine Mess

MENLO PARK, CA—Rainbird (3885 Bohannon Drive, Menlo Park, CA 94025) introduces four new games.

The Universal Military Simulator lets you re-enact some of the world's greatest military conflicts, such as the battles of Gettysburg and Waterloo. You can design your own battlefields and create your own armies, or place two armies from different eras into combat. $39.95.

In **Carrier Command**, a game of strategic warfare, you try to capture enemy islands and destroy its forces. You control the ship with a squadron of remote fighters, an amphibious assault division and 360-degree, turret-mounted laser cannons. $34.95.

The evil Acamantor returns to Belorn in the arcade game **Enlightenment**, 103 years after Hasrinaxx the Druid banished him. Hasrinaxx must scout Belorn to find the spells that will take him across to Acamantor's dungeon. He must then use his powers to defy Acamantor's demon princes who guard him, and finally destroy Acamantor with the mystical White Orb. $19.95.

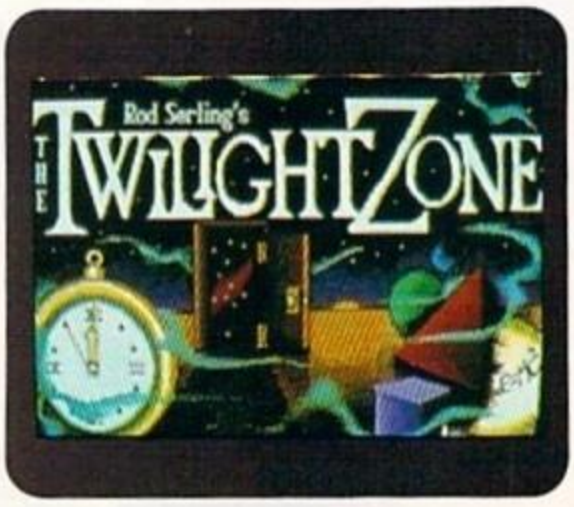
In **Black Lamp**, a medieval melodrama, Jolly Jack the Jester fights animated animals and characters to find the enchanted lamps and the Black Lamp. Reward for success is the hand of princess Grizelda; the price of failure is death. $19.95.

Starglider II, the flight simulator and sequel to Starglider, puts you in a futuristic spaceship with a 3-D instrument panel and sophisticated weapon systems, flying around alien deserts, destroying Egron patrol craft and rescuing alien colonies under Egron attack. $19.95.

Check Reader Service number 401.

Good TV or Bad TV

KING OF PRUSSIA, PA—In **The Twilight Zone**, you are that "normal person thrust into fantastic situations" as you participate in several stories that at first seem unrelated but eventually weave themselves into a single complex plot, complete with a patented Twilight Zone ending. $39.95.



First Row Software's fantasy adventure, The Twilight Zone.

Tired of watching bad TV? Do something about it—make it worse! In **Prime Time**, you get a chance to run a television network, buy shows, cancel shows and do lunch. $29.95.

In **Moses: The Old Testament #1**, you experience the many pitfalls and puzzles to make your mission challenging, like leading the children of Israel to the Promised Land. $29.95. First Row Software Publishing, 900 East 8th Ave., Suite 300, King of Prussia, PA 19406.

Check Reader Service number 406.

Speaking of Sports

SAN JOSE, CA—**Fast Break**, a three-on-three action basketball game, features full-court basketball from a television perspective. Playing under professional rules, you select defensive or offensive plays, design your own plays and substitute players. $29.95.

Serve & Volley, an action-strategy tennis simulation, emphasizes correct ball placement, timing and stroke selection. It features three levels of difficulty, practice modes and three different court surfaces. $29.95.

Rack 'Em, with an overhead and 3-D view of the pool table, contains five billiard games: snooker, bumper pool, straight pool, and 8-ball and 9-ball rules. The one- or two-player game lets you pick the object ball, pocket, aim, English and power. $29.95.

T.K.O., an arcade-style, split-screen boxing game, lasts a lot longer than 91 seconds. The first-person perspective gives you a feel for what it's like to be in the ring. Featuring both offensive and defensive maneuvers, boxers dodge and duck, and when hit, each boxer's face shows the damage he's sustained, such as black eyes, fat lips and swollen cheeks. $29.95.

In **Jet Boys**, you're a jet pack-equipped commando who must enter and deactivate an enemy-controlled reactor room and survive numerous waves of deadly galactic terrorist attacks. For one or two players. $14.95. Accolade, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128.

Check Reader Service number 412.

Battles R Us

NORTH VANCOUVER, B.C.—Taito Software (267 West Esplanade, Suite 206, North Vancouver, B.C., Canada, V7M 1A5) offers eight new games.

Alcon: Battle aliens with lasers, homing missiles, bombs and shields as you maneuver your SW475 over the planet Orac. $29.95.

Arkanoid: You need fast action to break down the 33 barriers that stand between you and DOH, the destroyer of the universe. $29.95.

Bubble Bobble: You and your two brontosaurus buddies battle battalions of evil beasties by blowing and bursting billions of bullies. $34.95.

Gladiator: Take a journey back to ancient Rome to become the strongest and bravest gladiator. $29.95.

Operation Wolf: The last of the hostages has been taken, and the only way to save them is to get in, strike hard and get out fast. $39.95.

Rastan: Be the invincible ancient warlord, Rastan, and kill off a host of evil lords and their servants as you try to defeat the mighty castle king. $34.95.

Renegade: Are you ready to be the baddest dude on the streets? Only you and your flying fists and killer kicks will ►

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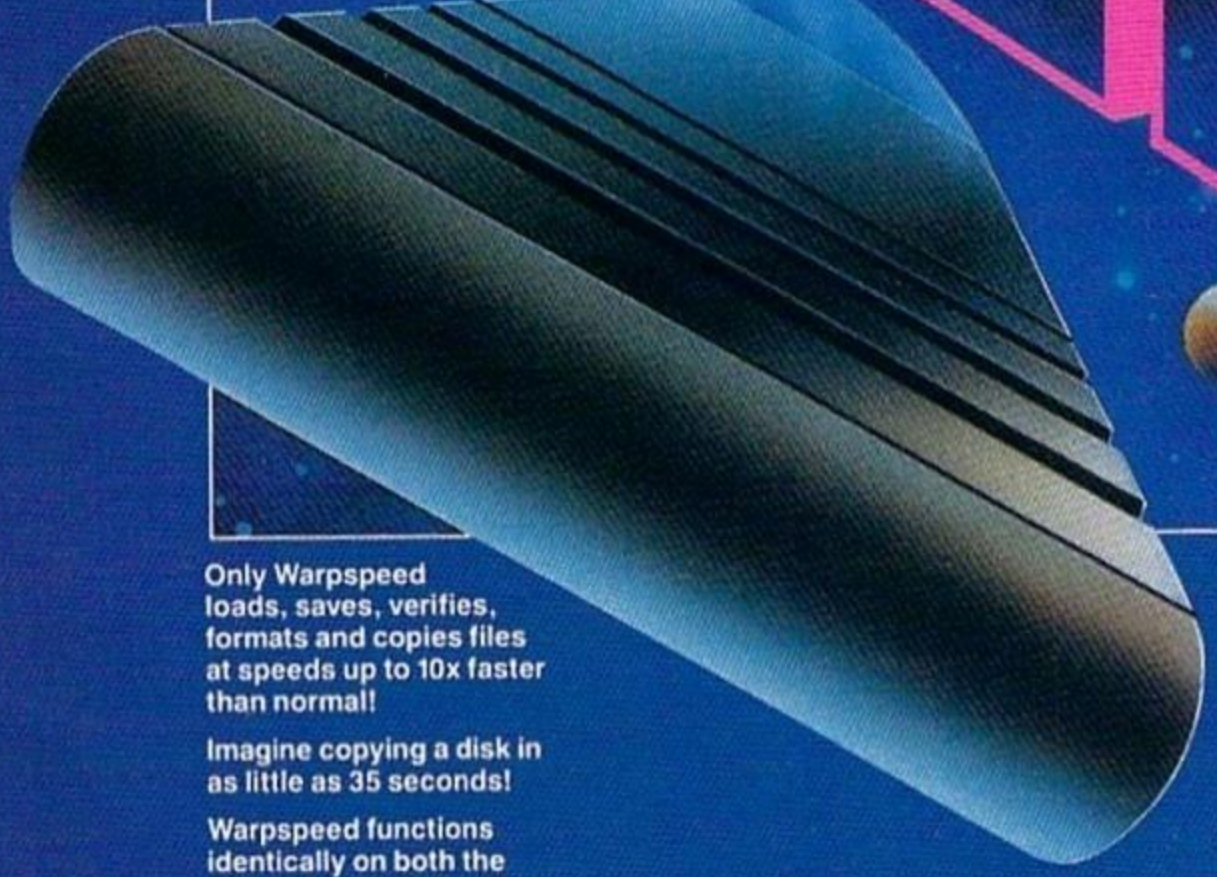

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put these gangs in their place. $34.95.

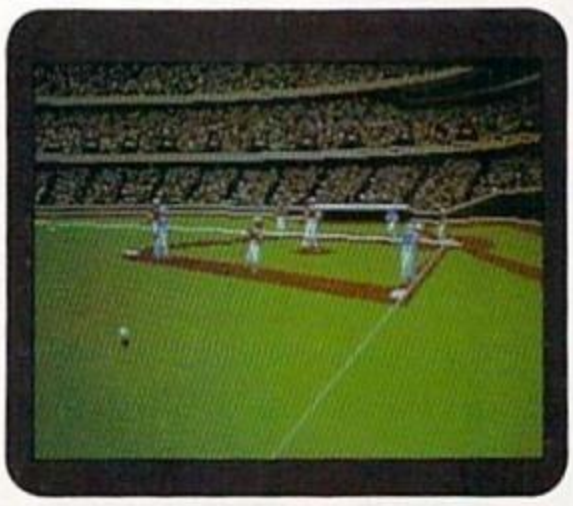
Sky Shark: Pilot the legendary P-40 Tiger Shark as you go deep into enemy lines. $29.95.

Check Reader Service number 408.

From the Edge of the Universe to Your Town

MENLO PARK, CA—Mediagenic (3885 Bohannon Drive, Menlo Park, CA 94025) adds two new games to their catalog.

Pete Rose Pennant Fever, a baseball simulation, challenges you to guide your



Pete Rose Pennant Fever, a baseball simulation from Mediagenic.

own expansion team through a ten-season, 24-team league race for the Pennant. Catch the action from eight different perspectives: behind home plate, at every base and from four outfield views. $34.95.

Main Event, a wrestling simulation, breaks all the rules, with outrageous characters and wrestling that's hard to believe—just like the real thing. Choose from eight rowdy wrestlers and battle for Tag Team Supremacy. $29.95.

Check Reader Service number 410.

Focusing Attention on Some Further Education

NEW YORK—Hi Tech Expressions (584 Broadway, New York, NY 10012) releases several new educational titles for the C-64.

With the help of Muppet characters Grover, Barkley and Cookie Monster in **Letter-Go-Round**, preschoolers ages 3 to 6 get practice in letter-matching and simple spelling. Graphics include a two-speed ferris wheel to help keep children's attention and encourage repeat play. Each of the three game levels progress to more challenging activities. $9.99.

The company's new line of three Electric Company software titles, below, helps children ages 6 to 9 to continue to develop their reading comprehension, vocabulary, word recognition and linguistic competence skills. They cost $12.99 each or $29.99 for all three:

Bagasaurus, a reading comprehension activity starring a dinosaur, encourages children to practice and develop vocabulary skills. Students collect on-screen words and pictures to make up stories about "Baggy's" adventures around the world.

Picture Place!, a beginning reading activity, helps children build their basic vocabulary and develop word-recognition skills. Children choose from six background scenes and create pictures, using words as building blocks.

Roll-A-Word, a linguistic activity, gives practice in rhyming patterns, learning word families and developing spelling skills. A word-generating machine assists as children spell words to match pictures and then create sentences with them.

The **Sesame Street Print Kit** lets children design and print out signs, posters, banners, greeting cards, invitations, stationery, story and coloring books, party decorations, placemats and games on their C-64s. Features include 60 Sesame Street Muppet characters in high-resolution outline, 20 decorative graphics borders and seven typefaces in three sizes and three fonts (italics, boldface and outline). A dot matrix printer is required. $14.99.

Swimware, a C-64 graphics program, produces personalized calendars (daily, weekly and monthly) with digitized pictures of swimsuit models. It also keeps track of important appointments, events and milestones and lets you plan ahead through the year 1999. A printer is recommended. $9.99.

Play the popular TV game show, **Win, Lose or Draw** on your C-64. Famous quotes, titles and sayings revealed with on-screen graphics inspire hilarious interaction among players. $12.99.

Check Reader Service number 416.

Adventure, a Quest, and a Trip to the Future

GREENSBERG, PA—**Wizard Wars** is a role-playing, graphics adventure where you, as the wizard, venture forth to defeat a host of dragons, elves, warriors and magic creatures and stop the plans of the mad wizard Aldorin. $44.95.

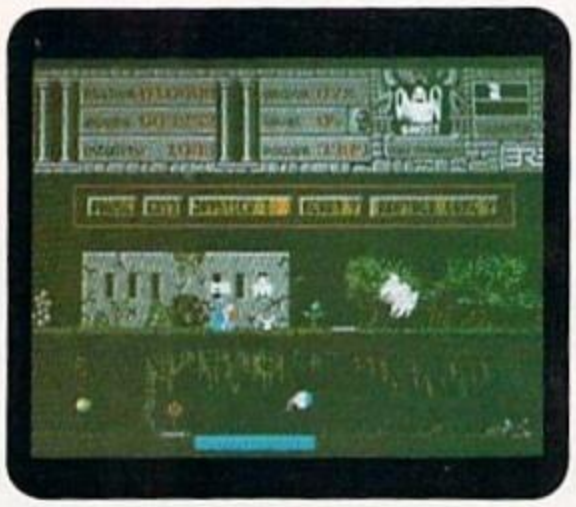
In **Master Ninja: Shadow Warrior of Death**, a graphic animation game, you are a great ninja warrior sent to recover a precious magical sword stolen by an evil Japanese warlord. $29.95.

The science fiction game, **Alien Fires—2199 AD**, places you in the role of a time lord sent to a distant planet to destroy an insane genius and his deadly invention. $29.95. Paragon Software, 600 Rugh St., Suite A, Greensburg, PA 15601.

Check Reader Service number 405.

Warlock

CAMPBELL, CA—In **Warlock**, an arcade-action adventure, you begin a quest to find the stolen Karna. It features 20 increasingly difficult levels of play.



Three-Sixty's arcade-action adventure, Warlock.

$29.95. Three-Sixty Pacific, Inc., 2105 South Bascom Ave., Suite 290, Campbell, CA 95008.

Check Reader Service number 403.

For Fans of AD&D

MOUNTAIN VIEW, CA—Strategic Simulations (1046 N. Rengstorff Ave., Mountain View, CA 94043) introduces two Advanced Dungeons & Dragons fantasy role-playing games and a utility to generate encounters in both games.

Located on the northern shore of the Moonsea in the Forgotten Realms, the city of Phlan has been overrun by monsters led by a mysterious leader. Your quest: Discover the identity of this evil force and rid Phlan of its scourge in **Pool of Radiance**. $39.95.

Heroes of the Lance re-creates the epic battle between good and evil on the world of Krynn. You control eight companions, each with different attributes and skills and guide them deep into the treacherous ruins of the temple Xak Tsaroth to retrieve the precious Disks of Mishakal, guarded by the black dragon Khisanth. $29.95.

Dungeon Master's Assistant, Volume I: Encounters, helps the Dungeon Master generate encounters for AD&D cam-

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paigns. It includes over 1000 separate encounters and over 1300 monsters and characters to help reduce game prep time by several hours per session. You can modify the existing data or add your own original monsters and encounters. $29.95.

Battles of Napoleon, a war game and construction set, lets you simulate practically any Napoleonic engagement on a tactical level. Generate random maps, then modify them, or build your own. Your terrain options include five levels of elevation, woods, roads, fields, swamps, water, towns and redoubts. Create your own armies with the number of men, types of units, weapons and nationality, and then rate the units for melee strength, leadership and morale. $49.95.

Check Reader Service number 414.

STARGAZING

CAMBRIDGE, MA—Follow Gable or Bogie down Sunset Blvd. See where the Rat Pack hung out. Attend a premiere at Grauman's. You can travel through eight eras, visiting old nickelodeons, Paramont Studios or Hollywood Theatre. Witness the changes to Hollywood Blvd. since 1910 and explore the many phases of film, from the silent screen to the latest blockbusters. Answer thousands of trivia questions about the stars. Included are 25 different mysteries for you to solve. **Ticket to Hollywood** is from Blue Lion Software (90 Sherman St., Cambridge, MA 02140) for $29.95.

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THIS ISN'T A *GAME*!

GRAND RAPIDS—You're right! It's **Award Maker Plus**, a desktop publishing package for the C-64 from Baudville (5380 52nd St. SE, Grand Rapids, MI 49508). With it, you create awards, certificates, coupons and more, from hundreds of predesigned award styles, then print them in color or black and white. Themes include home, education and business. $39.95.

Check Reader Service number 415.

OVERJOYED

MIDDLESEX, NJ—With the many games released for the C-64 so far this year, you may have worn out your old joystick playing some of them. Beeshu (101 Wilton Ave., Middlesex, NJ 08846) has two sticks that are compatible with the 64 and carry a one-year warranty. Hot Stuff comes in a choice of four colors (green, pink, yellow and blue), includes auto-fire, two trigger buttons in the handle, two base buttons for left- or right-handed play, and four suction feet to firmly anchor the stick to a surface. They're available for $12.95 each. The Zipper joystick has eight-directional control and an extra-long cord. It's available for $8.98.

Check Reader Service number 409.

STUPIDITY EPIDEMIC WIDESPREAD

SAN RAFAEL, CA—In **Zak McKracken and the Alien Mindbenders**, a comedy/thriller game, journalist Zak McKracken discovers that a worldwide stupidity epidemic is an extraterrestrial plot to reduce everyone's IQ. You help Zak search the earth and beyond for clues, allies and ancient artifacts to unmask the alien saboteurs and unplug the stupidity machine. $34.95. Lucasfilm Games, PO Box 2009, San Rafael, CA 94912.

Give kazoo to Zak
Push Open Walk to Put on Turn on
Pull Close Pick up Take off Turn off
Give Read What is Use Switch
kazoo egg
remote control nose glasses

Lucasfilm's comedy/thriller game, Zak McKracken and the Alien Mindbenders.

Check Reader Service number 404.

THERE'S NO PLACE LIKE HOME

SAN MATEO, CA—Electronic Arts (1820 Gateway Drive, San Mateo, CA 94404) releases eight new games.

Rockford, the hero of BoulderDash, returns in search of the Pharaoh's gold. You'll accompany the archaeologist on his arduous mission through five locations, from the Cavern of Craymar on a quest for the gold to the Kitchens of Kyssandra as you search for the Apples of Eternal Youth—each with four difficulty levels. $29.99.

In **Roadwars**, you find yourself in the 25th century, where a series of space roadways link the moons. Problems arise when a computer goes haywire and alters some of the magnetic side panels that keep vehicles on the roadways. As controller of an invincible interplanetary tank, you must destroy the altered panels and clear the roadways of killer sparks, spikes, barriers and vicious aliens. $29.99.

Alternate Reality: The City begins when an alien spaceship deposits you in a room with a single exit. Once you step through the door—into The City of Xebec's Demise—you find the weather, life forms and the rules against you. You'll need as much skill as possible to survive. $29.95.

In **Tomahawk**, a 3-D flight-combat simulation game, you're in command of a helicopter that reaches speeds of 200 knots, with advanced air-to-air combat techniques and weaponry, plus 13 on-board computers to help you carry out your missions. $29.95.

Someone sights an approaching piece of space rock the size of Louisiana, and, with the assistance of an adventurer, you search for Professor K. K. Renegade to help him build an anti-asteroid deflector. If you fail to find him or build the deflector in **Cosmic Relief: Professor Renegade to the Rescue**, Earth perishes. $24.95.

In **Reach for the Stars (Third Edition)**, a four-player game of space colonization and conquest, you are responsible for the survival of your race. Starting with one colony, you build your interstellar empire by searching for planets to colonize, managing your people's economic and social forces and developing its military power. $39.95.

Rommel Battles for North Africa, a strategy war game, takes place in 1941, when Rommel contested the Allied forces for control of North Africa. The game re-creates eight of the crucial battles from the North African Theatre, and the package's construction kit lets you create your own conflicts. $39.95.

In **Risk**, based on Parker Brothers' strategy board game, you build your military might to dominate the world. You can create your own game structure, and play against friends or computer opponents. The price of domination is $39.95.

Check Reader Service number 400.

SPACE RACE

SAN RAFAEL, CA—Broderbund Software (17 Paul Drive, San Rafael, CA 94903) introduces two new games.

In **Star Wars**, an arcade adventure based on the movie and coin-operated video game, you're Luke Skywalker, piloting an X-Wing Fighter in an attack on the Empire's Death Star. $39.95.

Downhill Challenge is an interactive ►

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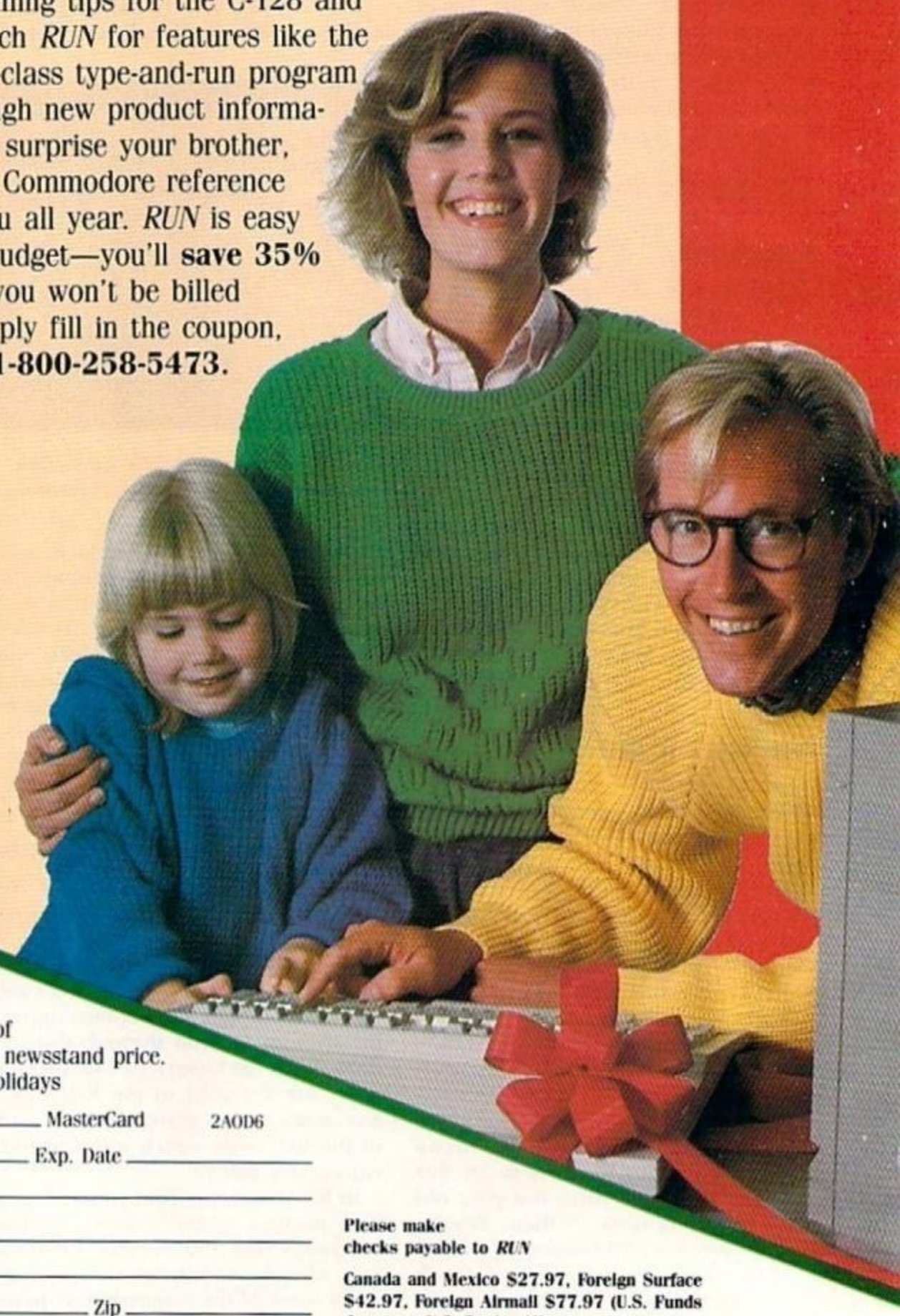

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ski-racing simulation with 3-D animation. Choose downhill, slalom, giant slalom or jumping events, each containing separate runs for beginning, intermediate and advanced skiers. Start practicing now for $24.95.

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One Man and a Thousand Babies

NORTHBROOK, IL—Torka, **Captain Blood**'s solar system sweetheart, has promised to bear him 1000 (!) little Bloods. But there's one problem—half a dozen Captain Blood clones are scattered around the galaxy, and they're sapping his energy. Your mission is to find the pesky clones and destroy them. $34.95.

Check Reader Service number 411.

Battles in or on the Field

WESTLAKE VILLAGE, CA—Civil war erupts in 12th century Japan, and your rivals kill your father and subvert the emperor. To redeem the family honor, you must command armies of samurai warriors, fight ninja assassins, negotiate alliances with other clans and confront your enemies in personal combat in the war game, **Lords of the Rising Sun**. $34.95.

TV Sports: Football, a sports simulation, puts you on the bench as the coach or on the field as a quarterback, running back or wide receiver. Choose the pro set, "I" formation or the shotgun; sharpen your skills in exhibition play or put it on the line in a regular season game. $34.95. Cinemaware Corp., 4165 Thousand Oaks Blvd., Westlake Village, CA 91362.

Check Reader Service number 402.

Overwhelming Odds

COSTA MESA, CA—As Hegor the Barbarian, you enter the fearful realms of the underground world of Durgan, a world terrorized by the evil Necron. Battling powerful warriors and horrific monsters, you must use all the wits you possess to defeat the cunning traps and ingenious machines protecting the path to Necron's lair. **Barbarian** is available for $29.99.

In **War in Middle Earth**, you follow Frodo, Aaragorn and Gandalf to get the ring to the Cracks of Doom. Ranged against you are the evil forces of the Dark Lord Sauron and the corrupt Wizard Saruman. The odds are overwhelming, but you cannot afford to fail. $59.99. Mastertronic International, 711 West 17th St., Unit G9, Costa Mesa, CA 92627.

Check Reader Service number 407.

Last but Not Least

REDWOOD CITY, CA—In **The Legend of Blacksilver**, the Princess needs you to rescue her father, the King, from the evil Baron Taragas. The powers of the mystical mineral Blacksilver has pushed the Baron to sink the continent and raise a new one from the depths of the sea, which he then populated with creatures

Final Assault, a mountain-climbing simulation from Epyx.

of his own twisted mind. As the hero, you'll roam a medieval world rife with politics, natural disturbances, fearsome dragons and powerful sorcerers, looking for clues and objects to help you save the King. $39.95.

Puddles, oil slicks, sidewalk cracks, a construction site and old man Baker's El Dorado are some of the dangers to watch out for as you play tackle in **Street Sports Football**. You choose your team from nine heckling hoodlums and pick your plays from a computerized playbook or design your own asphalt action. $39.95.

Players use their noodle in the sports parody, **Sports-a-Roni**. It takes place in Italy, where you race down the streets of Napoli in the Sack Race, balance a pile of Pasta Plates near the Leaning Tower of Pisa, pole-vault the Arno River in the River Jump or climb a pole slick with olive oil in Verona's Pole Climb. Other events included. $24.95.

Defy a watery grave in **Tower Toppler**, an action-adventure game. Eight towers rise from the sea on the planet Nebulus. You destroy them by activating destruction mechanisms at the top of each tower. To get there, you climb your way along slippery, crumbling ledges, through dark labyrinths, and deal with deadly, rolling boulders, flying phantoms and flashing blockades. $39.95.

Armed with a computer wristwatch, criminal radar locator, snare net gun, an .88 magnum and the V-Max, the most technologically advanced car ever built, your mission, as a member of the elite police force, the Enforcers, is to thwart the international crime family known as Death on Arrival, in **Technocop**. $39.95.

Battleship is now a computer game. The strategic adventure is enhanced with colorful graphics and digitized sound effects. A Salvo Fire option increases the challenge by allowing players only four shots per ship remaining. $29.95.

In **Mind-Roll**, a strategy game, players manipulate a ball that bounces and rolls through walls, floors and ramps drawn in elaborate, 3-D, real-world perspective in any of ten different games, with various levels of difficulty. $39.95.

Gear up and take on the icy unknown in **Final Assault**, a mountain-climbing thriller. Test yourself on some of the world's most treacherous peaks, but practice your knowledge and skills over the training course before tackling the big one. You should also prepare thoroughly for this rugged endurance test by carefully selecting the more than 50 items you'll carry in your rucksack. $39.95.

Trials of Honor, an adventure game, begins with a battle for a French kingdom. The monarch has been murdered and the assassin has assumed his throne. As the former heir to the throne, you journey across the realm—testing yourself in such games as an archery trial and staying alive by slaying menacing monsters—to prove your valor and your right to assume rule. $39.95.

Ice Thrashers, a cross between hockey, soccer and utter chaos, is set in the Superconductor Age, where you cut along the ice on magnetic skates to rack up points—and stay alive. Evade explosive devices, rev over ramps and leap bottomless pits, hurdles and jagged ice cracks. Multiple levels take you through rookie challenges and rinkriots. $39.95.

The Games—Summer Edition takes place in Seoul, South Korea. Knife through the water in the Springboard Diving event; strain for one more turn on the Uneven Parallel Bars; propel yourself to a record-breaking win in pole vaulting. Other competitive events include Velodrome Sprint Cycling, the Hammer Throw, Hurdles, Archery, and the Rings. $39.95. Epyx, Inc., PO Box 8020, Redwood City, CA 94063.

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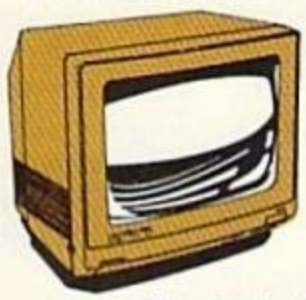

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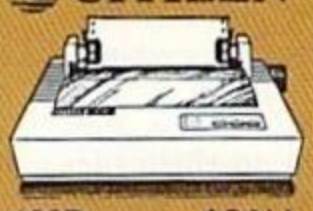

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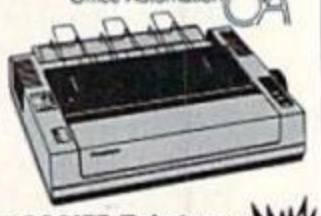

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MAIL RUN

RUN's readers defend their favorite word processors, look for BBS pen pals and tell why they patronize mail-order houses.

THE ASSEMBLY LINE

I enjoyed Michael Broussard's excellent review and comparison of machine language assemblers ("The Assembly Line," May 1988). As a result, I purchased Merlin-64 and am quite pleased with it. Keep up the good work.

—CHARLIE YOUNG
BENTON, AR

A MISSED SPELLING

We appreciate your article on word processors ("The Lastest Word," June 1988) and the fact that ours was included. However, the prices in the table on page 45 give the impression that FontMaster 128 is sold without the SpellMaster for $69.95 and that SpellMaster must be purchased for an additional $10. The current version of FontMaster 128 sells for $69.95 and includes SpellMaster 128. The older version retailed for $59.95, which owners can update to include SpellMaster for $10.

Also, the article stated that FontMaster 128 was unable to chain files. Page 51 of the FontMaster manual tells you how to chain files. It does work and is a feature of the program.

—JOHN SHOULTYS
MARKETING DIRECTOR, XETEC, INC.
SALINA, KS

The section of the manual entitled "Miscellaneous Formatters" states that: "When printing text, if FontMaster encounters this [CH: text file] format control, the file listed after the colon is loaded into memory from the disk and printing continues at the start of the file. This is useful when printing large documents that must be split into smaller files." We regret the error and any inconvenience it may have caused.

—EDITORS

MY WP IS BETTER THAN YOUR WP

Mike Cavanaugh's excellent review of five new word processors ("The Latest Word," June 1988) showed the persistence of the Commodore computers due to the constant upgrading of the software. Commodore also attracts third-party developers such as R. Eric Lee of Busy Bee Software.

After three years as the Pittsburgh Commodore Group Librarian, the only word processor I recommend is Busy Bee's The Write Stuff. The writeup caught most of its features, although the chart on page 44 should have a Y (for Yes) for 80-Column Video Preview.

—BOB AGOSTINO
PITTSBURGH, PA

You're right in pointing out that The Write Stuff does have an 80-Column Preview mode. Also, the 1581 drive is supported. The chart was in error.

—EDITORS

"The Latest Word" neglected to cover one of the best word processors, Timeworks' Word Writer 128. I recently received an updated version and, to my surprise, it's not copy-protected. You can answer Yes to all the features except for the 1581 drive and RAM expanders. There is also a great outliner and a mail-merge program, and the pull-down menus almost eliminate the need for a manual.

—NICK RICCIUTI
BALTIMORE, MD

What gives? Here you do articles on word processors, and you leave out one of the best buys on the market. Look in your own Productivity Pak. Your RUN Script is easy to use; others require you to memorize a chart of special characters or look up things. Not yours. Yours uses simple dot commands and logical command sequences.

I teach C-64 Basic in our adult enrichment programs in the Huntsville city school system, and I recommend and demonstrate RUN Script to the students.

—LYSLE E. SHIELDS, JR.
HUNTSVILLE, AL

I enjoyed your review on word processors but was disappointed when you failed to review WordStar. Although it's not for C-128 mode, it does work very well in CP/M mode and has some very nice features.

—BROOKE WHEELER
JACKSON, CA

What criteria do you use for evaluating word processors? You put down one of my favorite programs, Spinnaker's Word Pro, by saying its time had come and gone. To be sure, it's not a desktop publishing program, but for short documents and ordinary correspondence, it can't be beat.

—ROBERT E. WILNER
MEDIA, PA

TOO NEGATIVE?

Your August Telecomputing Workshop was so negative, I just had to write. Generally speaking, a columnist should be promoting telecomputing. If I were new to telecomputing, I'd be so scared of it due to pirates, hostage-holding, computer terrorism, viruses, and—you forgot to mention this one—tapeworms, I'd throw away my modem before calling any BBS. These problems are unknown to 99.99 percent of telecommunicators.

—THOMAS WEAVER
PENSACOLA, FL

STOCK DATA

Reviewer Peter King did a good job of reviewing our market timing system, Strategist (Software Gallery, May 1988). However, I think he overestimated, or at least overreacted to, the work required to obtain the historical data the program uses.

CompuServe has historical quote data for stocks, mutual funds and commodities, and a terminal program is included in Strategist's package for downloading them.

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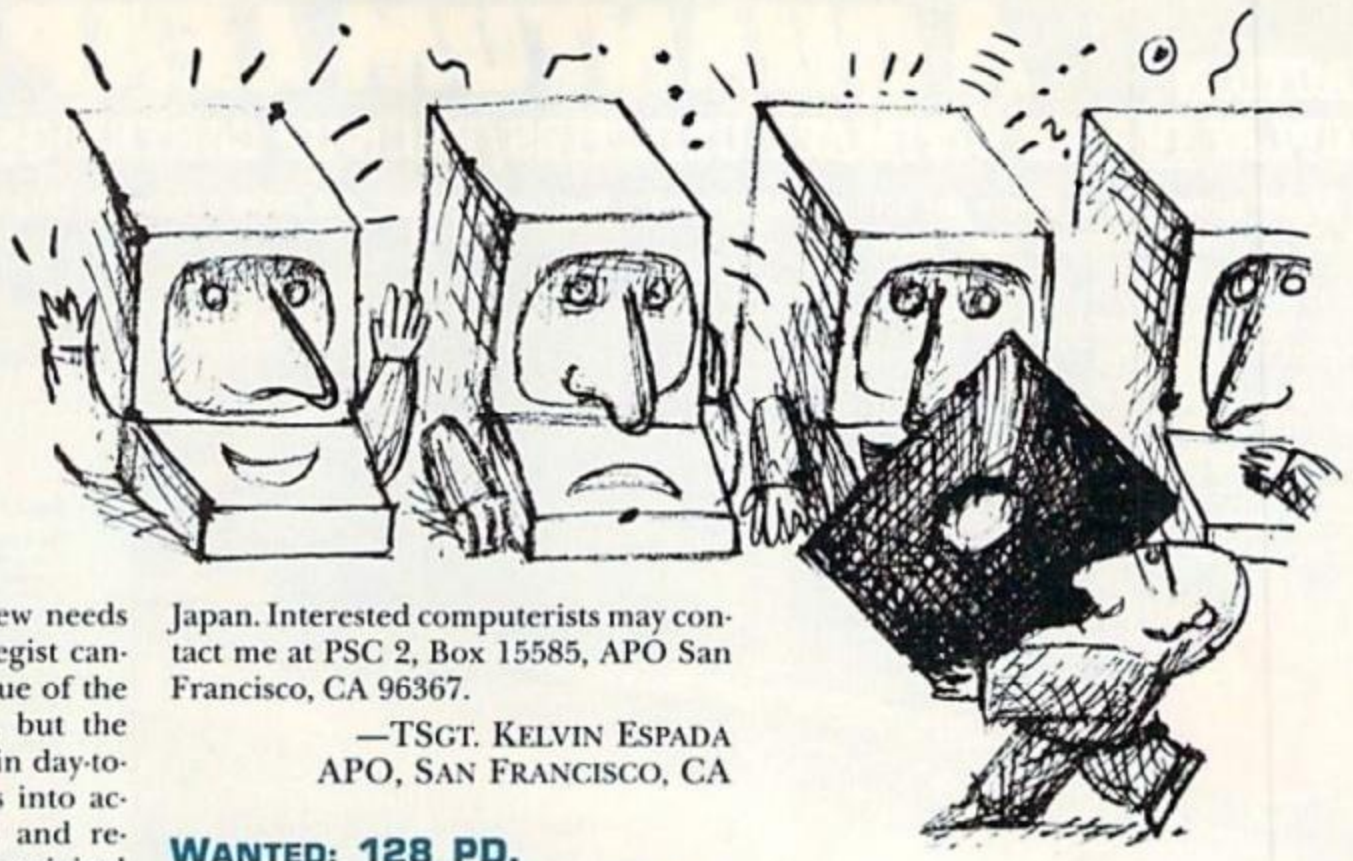

Also, one point in the review needs updating. Mr. King said Strategist cannot use daily quotes. That's true of the first release of the program, but the current release is fully fluent in day-to-day trading. It also now takes into account stock dividends, splits and reverse splits. Purchasers of the original version, which has a user number of 871279 or lower, can get a free upgrade by writing to us at Box 14-2403, Anchorage, AK 99714.

—Stan Jones
Strategy Software
Anchorage, AK

I Like My 1526 Printer!

I strongly object to you referring to the Commodore 1526 printer as a "maintenance disaster" and a "pretty poor printer" (Commodore Clinic, July 1988). I've been using my printer for heavy daily use for four years, the only problem being that I got address labels stuck under the bail roller.

I also put my 1541 disk drive through heavy use for five years with no problem until it was destroyed by a rampant three-year-old with a ball-peen hammer.

—Wayne V. H. Lorentz
Highland Lakes, NJ

We've always advocated keeping magnets and hammers away from disk drives.

—Editors

Can We Talk?

I'm a Technical Sergeant in the air force, stationed in Okinawa, Japan. We have a very active Commodore community here and are looking for your assistance in solving a problem.

We are trying to set up an electronic pen-pal system with some BBSs in the States. We would mail them our disks with our messages and they in turn would return those disks with any messages and replies. This way we hope to be able to maintain some contact with other computerists in the States while we spend our four-year tour of duty in Japan. Interested computerists may contact me at PSC 2, Box 15585, APO San Francisco, CA 96367.

—TSgt. Kelvin Espada
APO, San Francisco, CA

Wanted: 128 PD, Shareware and Freeware

I'm in the middle stages of publishing a 128 users guide to public domain, shareware and freeware programs. I need to hear from more C-128 programmers and to get their software out to all interested users. So far, I've reviewed over 200 programs for the book, but it's lacking in a few areas. If any of your readers have software of this type, they may reach me at Blynd Dog Publishing, 9410 E. 18th Terrace, Independence, MO 64052.

—Brad S. Burean
Independence, MO

Why We Buy Through Mail-Order

It's no surprise to me that "Commodore users are more apt to purchase... through mail-order..." and that "Commodore users rely on magazine articles..." (RUNning Ruminations, July 1988).

Just why do Commodore users rely so much on mail-order houses? There are several reasons. Foremost is the fact that Commodore historically has not supported small business. Instead, they seem to prefer selling to mass merchandisers such as Sears and K-Mart, none of which are qualified to provide after-sales support.

Furthermore, most computer store managers consider Commodore computers as nothing more than toys. Their attitude is supported by the plethora of arcade-action and role-playing games and the paucity of professional-quality software. Consequently, we can't just go to a local computer store, try out and buy the software and hardware that we want or need.

Also, without mail-order ads in the various Commodore-specific publications, we wouldn't even know that Commodore is still making computers. Is it any wonder then that most Commodore users resort to mail-order houses for making their hardware and software purchases?

The Commodore-specific magazines must provide us with comprehensive reviews, not overstated publicity, that reflect actual use of products currently available. We also expect magazines such as *RUN* to provide us with news and announcements of products for the Commodore computers.

—Dan W. Crockett
Pinetop, AZ

RUN Copy

The letter by Fred Nichols in the May 1988 issue of *RUN* ("Running RUN Copy," Mail RUN) says that RUN Copy 64 (February 1988) automatically formats a disk. My copy of RUN Copy doesn't do this. Is it supposed to?

—H. Mark Newman
Hastings, MI

Yes. RUN Copy formats a copy disk as it writes to that disk. Therefore, you can use a formatted or unformatted disk as a copy disk.

—Editors

A Call to Readers

This page is your stage, so stand up and say a few words. Extend praise, air grievances or offer hands-on advice and information.

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Plus other effects.
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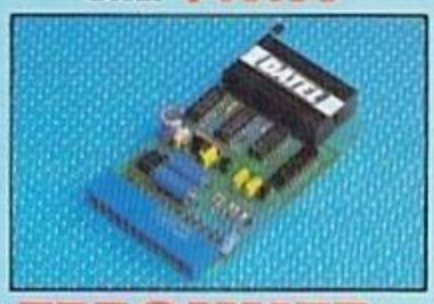

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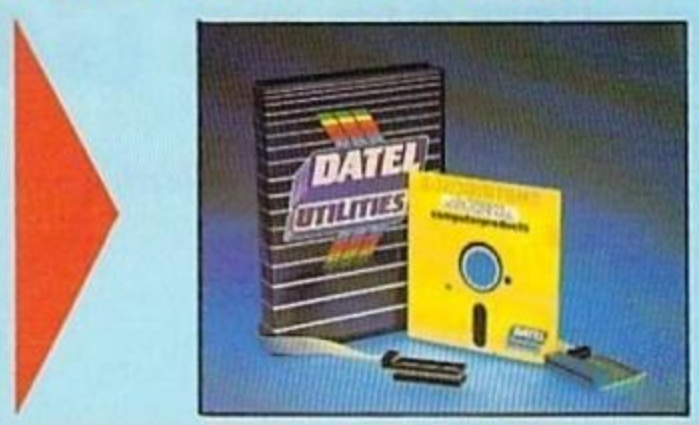

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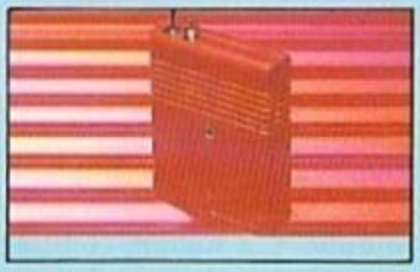

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SOFTWARE GALLERY

October is Computer Learning Month, so we've compiled a selection of reading, 'riting and 'rithmetic programs.

Compiled by BETH S. JALA

BANK STREET SCHOOL FILER ..... A–

An Organizing Dream Come True for Teachers

Teachers: Have you ever dreamed of a computer product geared entirely to your needs, complete with database capabilities and classroom management forms? How about content area data and suggestions for lessons that incorporate the data? Easy-to-follow screens, for both you and your students? An easy way to arrange information into tables? A tutorial, too?

Look no further. The Bank Street School Filer is available for the C-64. Essentially a database manager with educational files, it lets you variously manipulate information like grades, student addresses or financial accounts.

The program comes with a disk that contains forms for databases in which you can enter records. You can scan and sort files, find records that meet particular criteria, and print out data to screen, disk or paper in several easily altered formats, including text and tables. You can include comments on each record, and passwords will protect them from prying eyes.

You'll find that password protection comes in handy, because you may be allowing your students—in grades five and up—to investigate and alter data on companion science and social studies data disks. Students and teachers can create, edit and sort the files; they can also design and print custom reports. By doing so, students will be reinforcing their research, critical-thinking and information-management skills.

The astronomy disk, for example, includes files on constellations, pre- and post-1800 discoveries and planets. A log file contains the solar, lunar, tidal and temperature information for each of 52 consecutive Mondays.

Another content disk covers mammals and extinct and endangered species. Students can explore the endangered species of their own areas, and examine the causes of certain extinctions. Both the astronomy and the endangered-species disks include annotated bibliographies and glossaries that can be edited and updated. Each also comes with a teacher's guide that includes background information, introductory activities and reproducible activity sheets.

USE < OR >, [illegible] TO BROWSE
REPORT
CREATE FIELD
CHANGE FIELD
FIND
SORT
CLEAR
OTHER
The Bank Street School Filer
To make a new data base, use CREATE FIELD to define one or more fields. Then use ADD RECORD to begin entering data.
To work on an existing file select OTHER, then RETRIEVE to get the file you want.

Entering information into your Bank Street School Filer database will get you organized.

The Bank Street Filer and its companion disks are not perfect. The tutorial to the Filer is somewhat confusing, because actual forms, with their prompts, are displayed along with the tutorial instructions. The introduction to database terminology is weak; novices would benefit from earlier, and more complete, definitions of terms like "field" and "record." Also, the content files have various minor errors, ranging from unnecessary commas to the representation of unknown data—the surface temperatures of Neptune and Saturn are shown as "999."

These files—and others on North America, animal life, space and the United States—will never replace books; they are, by nature, limited research sources. Nonetheless, this product should prove a tremendous boon to both students and teachers. Ninety-nine dollars buys young students a wonderful introduction to database management that provides incentive for research and critical-thinking projects involving skills like generalizing, classifying and synthesizing. That same $99 also gets you a valuable tool for both teaching and recordkeeping. The Bank Street Filer does what it claims—and does it well. *(Sunburst Communications, Inc., 39 Washington Ave., Pleasantville, NY 10570. C-64/$99; databases, $59 each.)*

—SHARON G. WEINER
CHICAGO, IL ►

REPORT CARD

A Superb!
An exceptional program that outshines all others.

B Good.
One of the better programs available in its category. A worthy addition to your software library.

C Average.
Lives up to its billing. No major hassles, headaches or disappointments here.

D Poor.
This program has some problems. There are better on the market.

E Failure.
Many problems; should be deep-sixed!

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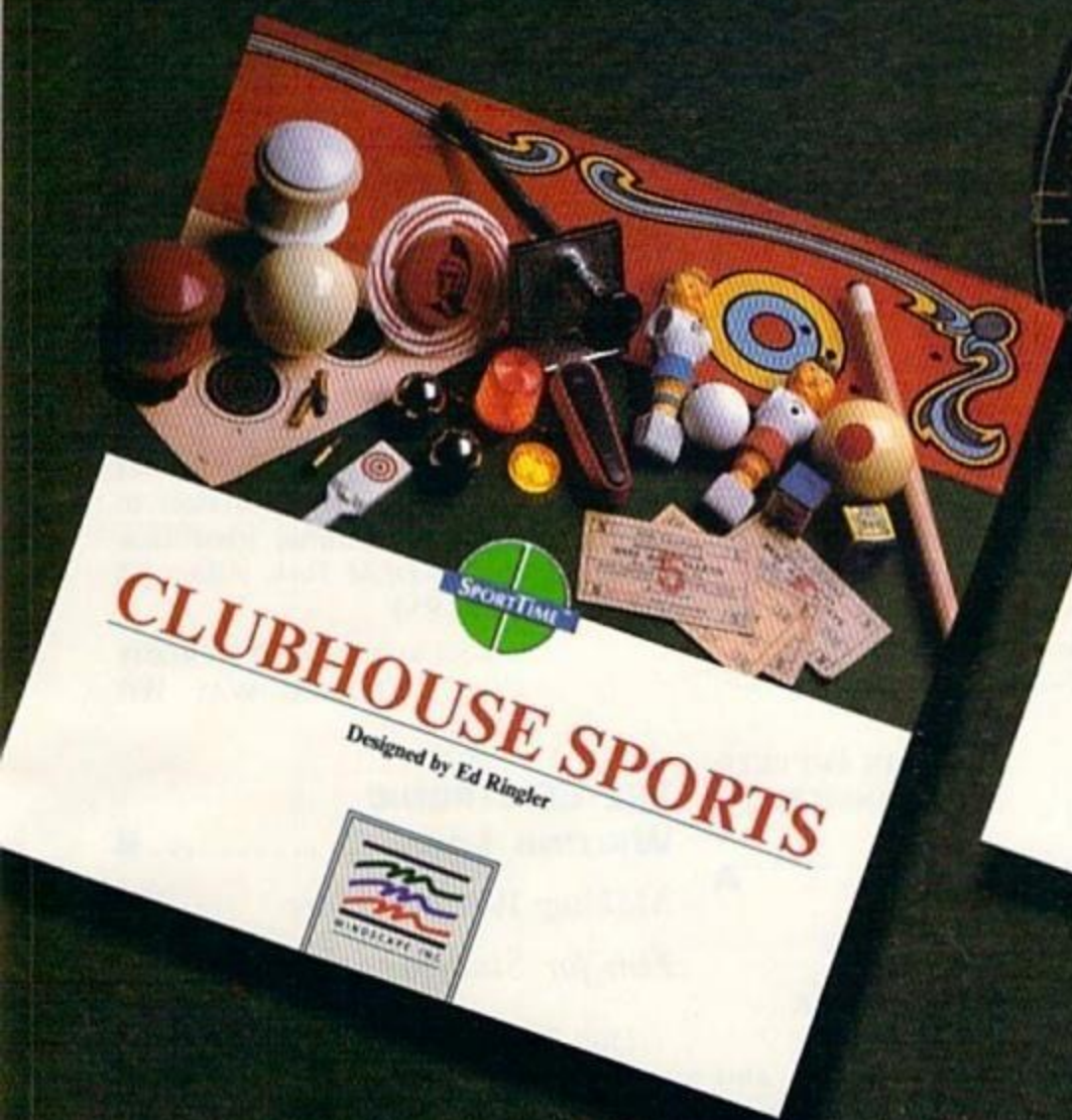
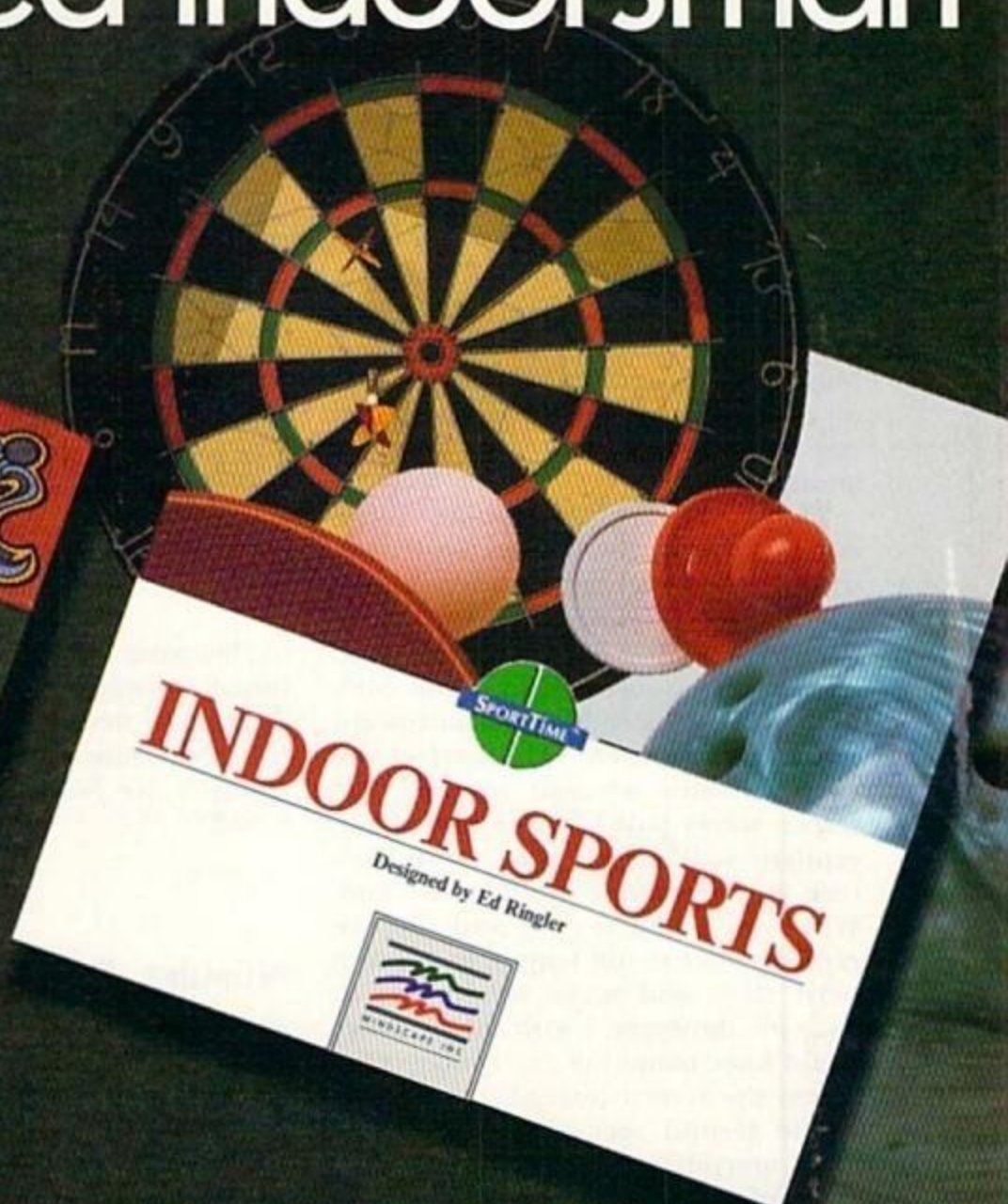
For the rugged indoorsman





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Accurate translations of the actual games, you can play in your own individual style. And you can play against the computer or play a 2-player game against a friend. Select from 5 computer skill levels.

Clubhouse Sports adds foosball, billiards, skeeball, crazy pool, pinball and a shooting gallery to the already proven Indoor Sports' bowling, darts, ping pong and air hockey. Now you can really enjoy the great indoors!

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PRE-READING ..... B+

An Attention-Getting, Letter-Matching Lesson

Pre-Reading, for children ages three through seven, offers a chance to practice the alphabet and to play matching games with words, shapes and pictures. Most of the program's six sections rely on colorful graphics and excellent special effects that grab a youngster's attention.

The first part, Caterpillar, introduces a row of five uppercase letters, with one represented by a blank box. The youngster must complete the sequence by typing in the correct letter. A wrong response prompts the computer to gently prod the player toward the correct solution. The correct answer activates a visual reward: The screen shows part of a two-legged caterpillar walking to the caterpillar's rear and attaching itself to the end. When the game is over and the caterpillar reaches full length, its colored parts flash and make sound effects. Nice job; however, I wish the designer could have made the caterpillar crawl across the screen instead of walk!

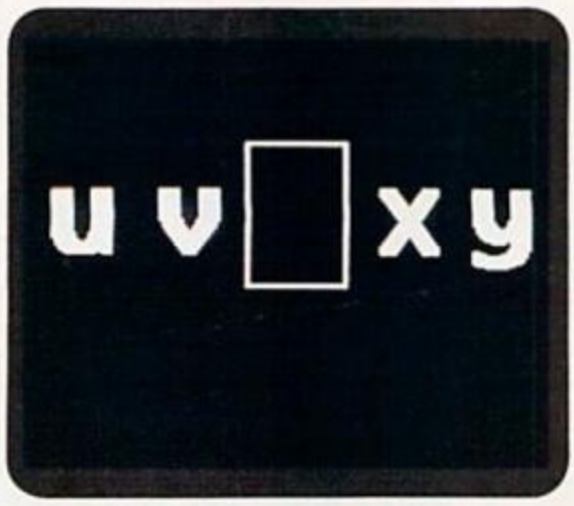
The second section, Train, resembles Caterpillar, but uses lowercase letters and a train. Correct answers cause the train to gain cars. You can even hear the "bang" as each new car couples on.

In the third part, First Letter, the screen reveals a picture and four separate letters. Youngsters must pick the letter that begins the word for the picture. For example, a ball of bright blue yarn is shown at the center of the screen, along with the letters L, C, Y and D. Picking Y reveals the correct response.

The remaining three segments, Pictures, Words and Shapes, offer a matching game similar to the television show, Concentration, without the background puzzle. During a turn, a player picks two boxes from an on-screen array. Each box opens momentarily to reveal a picture (or a shape or a word). If a match occurs, the player wins the item in the matching pair and gets another turn. At the end of the game, the winner is the player with the most prizes.

After completing a section in Pre-Reading, youngsters can play again or choose another section. Parents and teachers have the option to modify First Letter or Words.

Easy to play, Pre-Reading's approach to learning typifies MECC's educational software, and teaches children the crucial necessities of life in a fun-filled, dynamic fashion. *(MECC, 3490 Lexington Ave. North, St. Paul, MN 55126. C-64/$19.95.)*



Can you fill in the blank in this sequence of Pre-Reading?

—JOHN DIPRETE
CRANSTON, RI

NUMBER FARM ..... A

With an Oink, Oink Here And a Quack, Quack There...

Number Farm is a colorful and musical early childhood program. It contains six games that introduce numbers and counting to preschool children. Although the purpose of the software is to teach the numbers one through nine, it could also be used for learning the placement of numbers on a keyboard.

Animal Quacker is the most charming of the six games, with farm animals quacking, mooing or oinking a predetermined number of times. The child listens to the animal, counts the sounds and enters the correct number.

During Old McDonald, the farmer plays the familiar song and after ". . .on this farm, he had ? ducks," the program pauses for the child to enter the number of animals displayed. If an incorrect number is chosen, the farmer counts out the animals again and waits. When the correct response is given, he nods his head and continues the song.

Number Farm show the numerals 1 though 9 and asks the child to press any key. After displaying the corresponding number of animals, a farm song is heard. Crop Count is a fast-paced game played to see how many correct crops can be counted before the sun sets. This section can be attempted by more than one child, each one trying for the highest score. Hen House is a variation of "pick a number between one and ten." The object is to guess how many eggs are hidden beneath the hens. After each guess, the farmer tells you to guess higher or lower.

The final program, Horseshoes, lets the child control the farmer's horseshoe pitches. If the requested number of horseshoes is thrown, the farmer gives the "okay" sign and plays a happy tune.

There is no recommended age for this program, but I would suggest it for preschool children. An adult needs to help the child by reading the instructions and encouraging him or her to answer the farmer's questions. Number Farm is a wonderful introduction to numbers and farm animal identification. *(DLM, One DLM Park, Allen, TX 75002. C-64/$32.95.)*

—SANDRA COOK JEROME
FEDERAL WAY, WA

THE ELECTRONIC WRITING LAB ..... B

Making Writing More Fun for Students

The Electronic Writing Lab is a menu-driven program that teaches writing through the "guided composition" technique. According to its thorough, 65-page manual, it is designed for middle and junior high school children, but can be used with both younger and older students.

This C-64 program also runs on a PET, and there are versions available for the TRS-80 III/4, PC Jr, Apple II, IBM-PC and compatibles. Because of the affordable price, most students who have a Commodore at home could buy it for extra practice, regardless of the type of computer used at school.

Those of us who have entertained unwholesome thoughts regarding software publishers when loading heavily copy-protected software will appreciate the fact that this program is unprotected and can easily be copied. In fact, the manual instructs you to copy both sides of the disk before using it because each student will need his or her own copy of the program. Publisher J. Weston Walch's policy seems quite fair: copies for all the students of one teacher's single class can be made for the price of $29.95. Copies for more students are authorized for double or triple the price.

Included in the manual are additional suggestions to help the teacher ►

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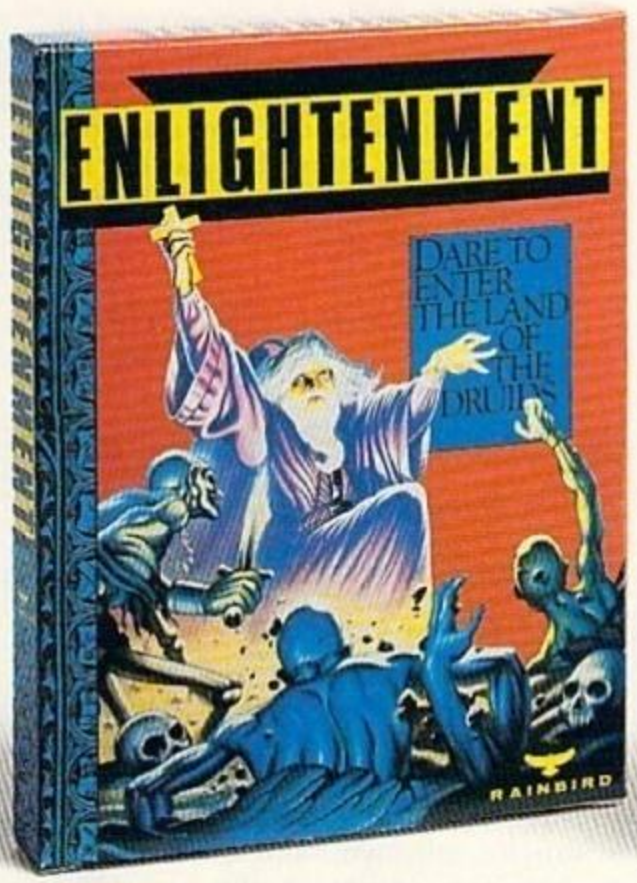
DOWN. OUT. AND OUTRAGEOUS.



ENLIGHTENMENT

This is no ordinary descent down . . . we're talking way down. To the world of the undead.

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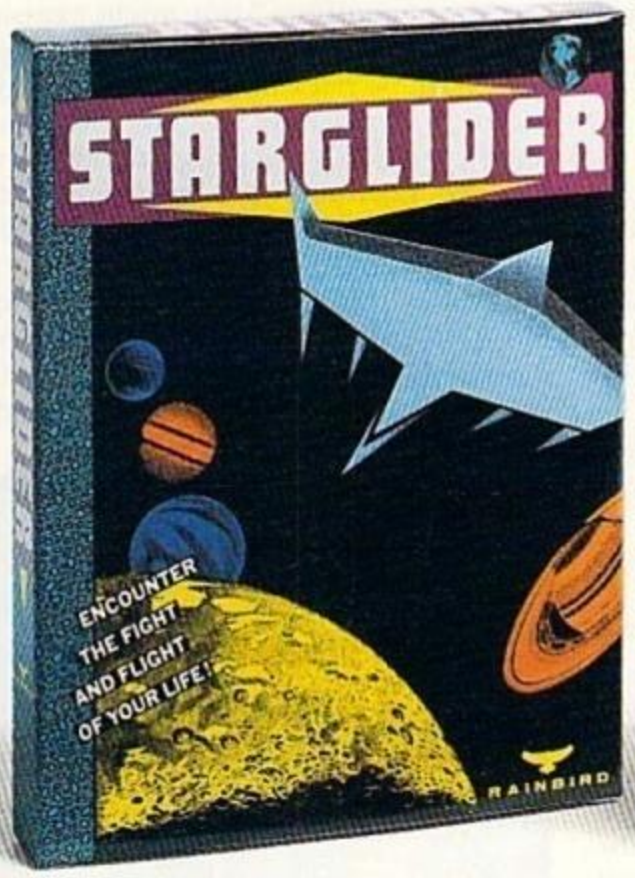

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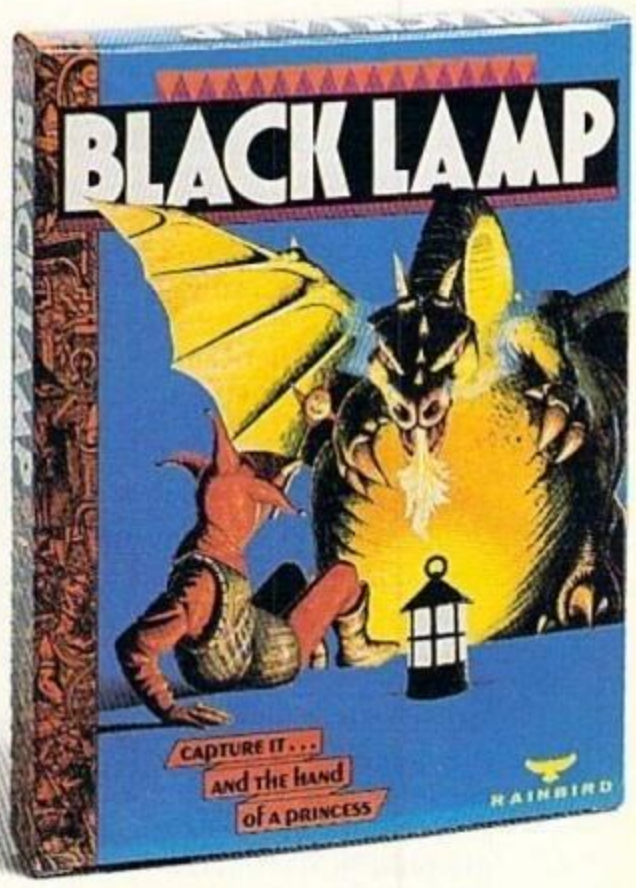

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ENLIGHTENMENT: Amiga $29.95. Commodore 64/128 $19.95. STARGLIDER: IBM $29.95. Amiga and Atari ST $24.95. Commodore 64/128 and Apple II $19.95. BLACK LAMP: Amiga and Atari ST $24.95. Commodore 64/128 $19.95.

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plan new writing topics, as well as a brief explanation of the theory and practice of teaching writing and five pages of useful printed materials to copy and use.

On one side of the disk is the Student/Write Stories program, which contains 15 topics to write about. Seven of these are creative (e.g., "Alone in the Wilderness," "The Alien Force"), while eight are expository ("This is My Life," "Boys or Girls: Who Has it Roughest?"). The topics seem as likely to inspire originality and interest in writing as those in any English composition book I've seen. The program allows for teacher creativity as well: On the other side of the disk is the Teacher/Create Stories program.

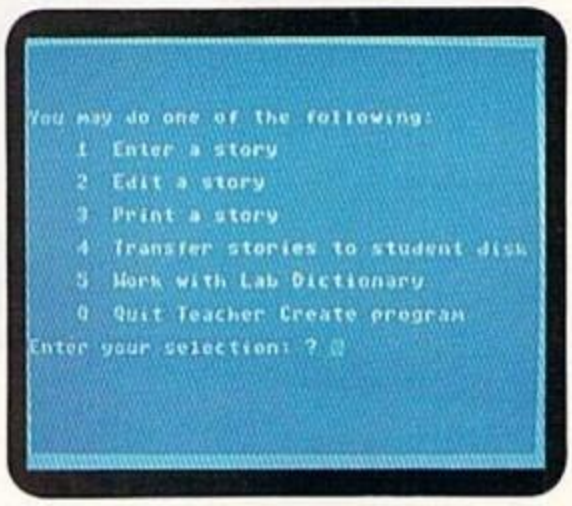
There is a help menu to assist in editing, as well as a 1200-word dictionary, which is rather limited, but adaptable. Up to 50 words can be added to the built-in dictionary, and if some or all of the original words are deleted from the work disk, up to 1250 can be substituted. Words of three or fewer letters are not checked, and verb forms ending in -ed and -ing are not included. When designing new dictionaries, the writer needs to remember that most forms of a verb are counted as separate words: use, using and used are deemed to be three different words. Thankfully, there is a provision for plural endings.

The built-in editor responds to a series of double and triple key presses, but the program is not quite a word processor. For example, there is no provision to cut out a section and paste it elsewhere. Still, there are enough features to convince a student that a computer can be superior to a typewriter or a pencil and paper.

A starter paragraph is provided for each story. Responding to prompts, the student adds five paragraphs, one at a time. The use of prompts should help keep students on the subject. Each response can be up to 18 screen lines long—about 120 words per prompt. This could prove to be a blessing to some and a curse to others—not everyone will be able to finish a story in 600 words. By making the goal quality, rather than quantity, this limitation could benefit students who tend to be wordy.

I am not aware of any other writing instruction program for the Commodore that is more versatile than The Electronic Writing Lab. Still, the program could stand some improvement. Any software designed to be used with a roomful of junior high students should be totally bombproof, and this one is not. When the screen says "press any key to continue," one might expect an eighth grader to press the run/stop key, perhaps because he or she really wants the program to run. Unfortunately, this stops the program and any unsaved portions of a story are lost. (This problem could be eliminated with a Poke or two.)

Because the program is written in Basic, it does have its drawbacks. Although the single quote (') can be used, and a blank line can easily be inserted between paragraphs, quotation marks are not accepted, and paragraph indentation is not possible. Also, a student who can type over 20 words per minute will notice a significant delay between the keypress and the appearance of the character on the screen. The Dictionary option also causes a major delay, as the program notes on screen whether each word is "ok" or "not in the dictionary." All those words not in the dictionary are printed out as many times as they appear.


You may do one of the following:
1 Enter a story
2 Edit a story
3 Print a story
4 Transfer stories to student disk
5 Work with Lab Dictionary
0 Quit Teacher Create program
Enter your selection: ? 0

An example of your choices on the Teacher/Create side of The Electronic Writing Lab disk.

The final printout is 38 columns wide and cannot be right-justified or altered. Stories are saved as relative files, which cannot be easily loaded into a word processor for altering the printout. However, I had no difficulty printing out a story with my Star SG-10 printer and Xetec Super Graphix interface.

The Teacher/Create option might enable a teacher to use the program for many years without ever repeating an assigned topic. This option could be used to adapt the program to help either precocious third graders or even college freshmen with writing deficiencies.

All in all, The Electronic Writing Lab could easily form a worthwhile part of either an English composition course or a computer literacy course. Like any computer-assisted learning program, an instructor should expect to spend enough time working with it to understand possible student reactions and to avoid problems. I don't think anyone could use this program without learning something useful about composition, word processing, computer-assisted instruction, or all three. *(J. Weston Walch, PO Box 658, Portland, ME 04104-0658. C-64/$29.95.)*

—RICHARD H. ELDRIDGE
MIAMI, FL

DRAGON GAME SERIES .. B–

Learn Parts of Speech With an On-Screen Board Game

The Dragon Games Series (DGS) is a menu-driven collection of six similar games designed to teach students how to identify nouns, verbs, adjectives, synonyms, antonyms and contractions. Besides two copies of the one-sided program disk, the package consists of a 12-page manual in a large looseleaf binder.

Each game contains a short, clear tutorial on how to use the program. The goal in each case is to reach "home" by answering at least ten questions correctly; as few as two incorrect answers causes Gnzrabab, a multicolored fire-breathing dragon, to appear, and ends the match.

Five of the games are multiple-choice, in which only one of three correctly spelled choices displayed below the game board is accepted. In the sixth, the contraction game, the student must type in the correct contraction of the two words shown.

In all the games, a spot that marks the child's progress advances one square towards home for each correct answer. An error sends the spot three steps towards doom. And, Gnzrabab can get bored: If the student fails to reach home within 40 tries, the dragon does his fire-breathing act and terminates the competition. When the player successfully reaches home, an unseen king rewards him or her with a multicolor graphic of a treasure chest. After each win or loss, the player is offered an opportunity to repeat the same game or to load another.

DGS is easy to understand and fun to play; the examples are quite humorous. For instance, the sentence "The dragon roasted Dylan in Cleveland" is used to define a noun as the name of a person, place or thing.

The pictures of the dragon and treasure chest are well done and unlikely

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to frighten even the youngest child. As a matter of fact, after displaying the treasure, the program asks for a loan of a few thousand dollars. A "yes" from the player elicits "Thanks! I need it for dragon chow," while "Phooey on you!" follows a negative answer.

Except for the graphics screens, each part of the package is written in Basic, and can be listed, changed, resaved or possibly compiled. Even a fast typist won't be irritated by input delays, because the answers are brief and the programs fairly short. My daughter, a high school sophomore, found DGS easy to use and more fun than doing exercises in a book. She wasn't bored even after 90 minutes of play.

Flexibility is the best feature of DGS. The publisher's claim that a fourth grade reading level is necessary seems accurate, as does the claim that even senior high school students could benefit by using it with instructor-written word files. The synonym and antonym games should prove particularly useful for teaching new vocabulary words at the high school level. The editor program, which allows the instructor to write and edit new lists of words, works smoothly.

As any teacher knows, Murphy's Law—anything that can go wrong, will—tends to rule in the classroom. Hence, the only major potential problem I would anticipate with DGS is that pressing the run-stop key stops the program. Any Commodore program designed for classroom use can and should be student-proofed by disabling this key and the run-stop/restore combination.

There are a few minor errors in the built-in wordlist for the noun, adjective and verb games and the rules. For example, the program doesn't acknowledge that "brass" can be a noun as well as an adjective. Also, the rule given in DGS that a contraction is formed by replacing a missing letter with an apostrophe is not always true: will not contracts to won't. Furthermore, one of the sentences shows a number under eleven written as a numeral rather than spelled out, which is the general convention.

Dragon Games Series does not come close to fully exploiting the features of the C-64. There is no animation other than the dragon's fire-breathing bit, no way to store student scores, and sound effects aren't used. Also, a method to print out word files written in the Editor mode would be helpful.

Many words, such as "cross" or "fly," have several meanings, and their use as a noun, verb or adjective depends on context. There is no context in these games, since the words don't appear in sentences. Careful thought and planning should avoid confusion when writing new wordlists, however.

Although DGS doesn't provide for printing word lists, they're saved in sequential files, and could therefore be loaded and printed out by most word processors or a sequential file reader/printer. These could then be included in the documentation binder or inserted in lesson-plan books.

The software seems to include all the commonly used contractions, but an exhaustive list can be found in many English handbooks, and a new list could be organized according to the instructor's best judgment.

All in all, Dragon Game Series deserves consideration for inclusion in elementary, middle and junior high school English curriculums (the publisher recommends grades 3 through 6 as appropriate). If new word files ►

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are written, it could be a worthwhile addition to a high school English computer lab program as well. Since it's available for nearly every breed of computer, and is adaptable to varying needs, DGS could also be a popular and useful program for extra practice at home or for students attending school at home. Its price is about average for educational programs of this type, not all of which have its flexibility. *(Educational Activities, Inc., PO Box 392, Freeport, NY 11520. C-64/$59.95.)*

—RICHARD H. ELDRIDGE
MIAMI, FL

MATH POWER ..... B+

It Takes Fast Thinking To Make the Problem Fit the Answer

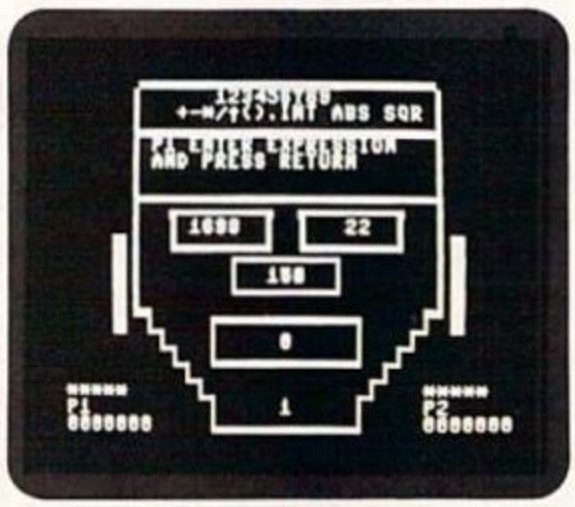
One of the primary aims of good mathematics teaching is surely to engender in students a "sense" for number, along with skill and resourcefulness in using arithmetic operations. Math Power is an impressive package—including both a computer game and a book—that takes an unusual approach toward developing such sense and skill. I want to make clear at the outset, however, that unlike the many straightforward addition and subtraction practice games for young children, Math Power operates at a fairly high level of sophistication.

Try the following example to get the flavor of the program: Use all of these four digits—3, 4, 6 and 7—to create an arithmetical expression that equals 13. (If you really get stumped, three possible solutions are shown at the end of this review.) You may use the digits in any order (but use each one only once), combine two or more into a number (e.g., 63) and employ any of the following operation and function symbols as often as you wish, being careful, of course, to observe order-of-operation rules:

- +, −, * and / (the four fundamental operations).
- . (decimal point).
- ( ) (parentheses).
- ↑ (exponentiation).
- SQR(N) (square root of N).
- ABS(N) (absolute value—the value of N without regard to sign).
- INT(N) (greatest integer function—the greatest integer less than or equal to N. This is used to eliminate decimal fractions).

The example above is relatively simple, but even so, it's easy to get flustered and stop thinking when you're working against time, as you do in the game (three minutes is the default limit per problem). When you start to play, it quickly becomes clear that you need a lot of preliminary practice to feel comfortable with this type of exercise. That's where the book comes in.

Written by a math teacher, the 418-page book is printed on heavy stock and is ring-bound so it opens flat for photocopying. (Yes, copying within limits is encouraged, for the package is intended for teachers to use.) It contains tutorials, with many examples and tables, on all the integer operations outlined above, as well as worksheets, a chalkboard game and thousands of exercises arranged in ascending levels of difficulty. I think it is essential that you thoroughly investigate the contents of the book before you tackle the computer game.



You must work out solutions to problems on the robot's forehead in Math Power.

In the game, you can access a password-protected teacher's menu by pressing the control and P keys while the program is booting. With an eye toward the ability level of the students who are to use the program and what they have been taught, you can set 13 parameters, including, for example, fewer or more operation symbols; more or less time allowed per example (one to five minutes); number of digits used (four, five or six, with six the easiest to manipulate) and which ones (zero is excluded); and the range of answers (within the limits of −100 to +100).

One or two players can participate, and scores are based on several factors, such as order of digits used and time elapsed before the correct solution is entered. The game screen is a rather unappealing robot face, on various areas of which appear the numbers and symbols allowed, space for messages and entering solutions, the digits chosen, the answer to be achieved, the descending time and the players' cumulative scores. If all the parameters have not been preset, the players can make a number of choices; for example, the number of digits and which ones. You're also given the chance to enter an Instruction mode, in which examples are displayed.

Play proceeds by pressing return, when prompted, to produce a problem. Your digits are displayed in one robot eye and the answer in the other. You work it out on paper or in your head, aware that there are probably several possibilities. Then you carefully enter your solution, check it and press return. Correct or wrong, the robot's forehead tells you. If wrong, you get two more tries—as long as time doesn't run out. If correct, your score is increased, and it becomes the other player's turn.

The Math Power game is one that most students—and probably most adults—will find difficult, but if you persevere long enough to get the hang of it, it can certainly sharpen your mathematical wits and fine-tune your ingenuity. The time pressure could be especially frustrating, however, for young children or leisurely thinkers, which leads me to advise caution. The computer game is certainly not an appropriate *teaching* tool, although the book could be.

Outside of a few errors (possibly typos) in the book, I found Math Power carefully and thoughtfully developed and presented. There's little doubt it can be a beneficial stimulus to eager young minds who like their arithmetic served up in a challenging and nontraditional way.

Here are the answers I promised above: 1. 7/(4 − 3) + 6; 2. 63/7 + 4; 3. 3*4 − 6 + 7. *(J. Weston Walch, PO Box 658, Portland, ME 04104. C-64/$49.95.)*

—SWAIN PRATT
RUN STAFF

ADVENTURES WITH FRACTIONS ..... B

Facts About Fractions Made Fun!

Do you know how to find the common denominator of two fractions? Adventures with Fractions contains three programs that are designed to introduce the concept of fractions to children and to teach them how to compare fractions and find common denominators. ►

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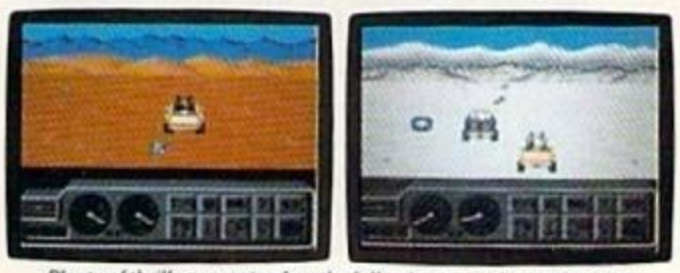
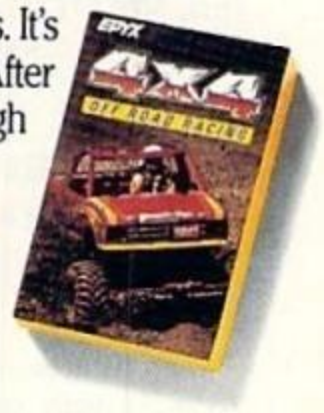


Plenty of thrills guaranteed on the following grounds: gumbo mud, packed snow, skid-sand, and the scrubbiest terrain south of the border.

Fight the torturous terrain of Baja. Rocks, boulders, skid-sand, even a few spikey cactuses. And of course, heat that's hot enough to fillet any forehead. Ever had your hands stuck to the wheel? Permanently. You will when you endure the longest winter of your life in the ice, sleet and slosh of The Michigan Course. The Georgia Red Clay Course has enough mud to keep you a human fossil for 2,000 years. And then there's Death Valley. Get it. D-E-A-T-H Valley.

Start with pre-race strategy. Select and customize your personal vehicle. Your supplies. Your repair equipment. Believe us. You'll need everything. There are boulders, rivers, potholes, and mudbogs to contend with. What are mudbogs? You'll find out. (Just after you find out there's a Demon 4 x 4 chasing you all through the race. A Demon hellbent on your destruction.)

If you win enough races, collect enough points, only then will the Victor's Cup be yours. It's the least we can do. After all, you did go through hell to get there.



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One program, Comparing Fractions, first utilizes a small tutorial to graphically represent the idea behind fractions. Two candy bars are shown with one-half of one highlighted against two-thirds of the other bar. The student is taken through different steps to visually select the largest piece. At the end of the tutorial, the need to find a common denominator is explained.

The next section in Comparing Fractions demonstrates how to find a common denominator by changing each of two fractions to equivalent fractions until the denominators are the same. The final section uses the method of multiplying the denominators of the two fractions to obtain a common multiple. These three sections can be entered at any time by answering questions regarding ability.

The second program, Cross Products, is a tutorial that presents a short-cut method to compare unlike fractions without finding a common denominator. The last program, Ransom, is a game that can be used for review or initial testing of the student's skills. In the game, a prince has been kidnapped and gold coins are won to pay the ransom for his release. To collect these coins, three fractions are displayed on three doors and the largest one must be selected. If the choice is correct, the collection of coins is increased, but if it's wrong, a monster comes out from behind the door and steals away some of the coins. When the necessary coins are accumulated, the prince is released. There is a Management option that lets a teacher or parent change the difficulty level, time limit or number of coins needed to pay the ransom.

Although the recommended age level is ten through 14, it's important to know whether or not fractions have already been taught. If not, this program is a good introduction to the concept of fractions. If fractions are currently being taught, Adventures with Fractions is limited because it doesn't go beyond the concept of comparing two fractions. *(MECC, 3490 Lexington Ave. North, St. Paul, MN 55126. C-64/$19.95.)*

—SANDRA COOK JEROME
FEDERAL WAY, WA

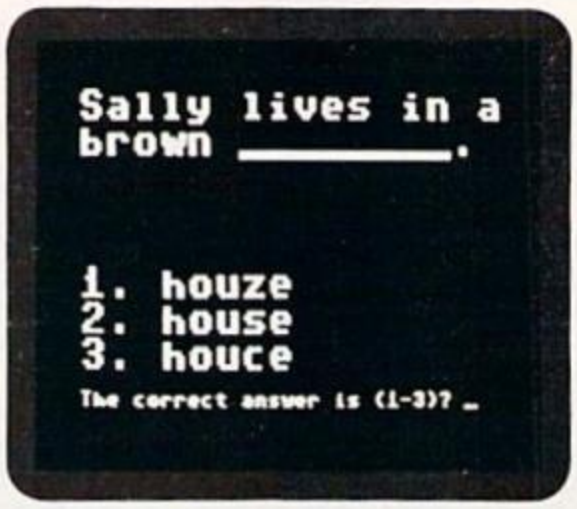
SPELLING BEE ..... B

"Spell 'Spell'"!

"S-P-E-L-L"

For children of ages eight through 13 who wish to brush up on their spelling skills, Spelling Bee offers a total of 400 sentence-completion trials in a multiple-choice format. Twenty separate sections provide a series of increasingly difficult drills on verbs, nouns, pronouns, contractions, and so on. More words and sentences can be added and saved to disk.

A time-saving educational tool, Spelling Bee keeps score and lists all misspelled words at the end of a drill. Children can interrupt a section at any time to find out their score or to start on another section. When a section is replayed, a new random order appears.



Does multiple choice make it harder or easier to find the correct spelling in Spelling Bee?

Children who wish to spur their efforts can choose to race against time. In this mode, a youngster must pick the correct answer before a bee at the bottom of the screen reaches a flower. The bee's flight time can be set between 12 and 30 seconds.

Here's a typical sentence and word choice taken from the easiest section: "You can put your books ." 1. way 2. a way 3. away. Another section 1 sample is: "Did you eat of your supper?" This is followed by: 1. awl 2. all 3. owl.

Here's an example from the hardest part: "Janet was not in time." The player can choose among: 1. reddy 2. ready 3. redy. Another from that area is: "We should be finished by ." Answers to choose from are: 1. Frieday 2. Friday 3. friday.

In summary, the primary value of this program is in its ability to train children in spelling, using a technique where youngsters can see each word and its context in a particular sentence, and receive immediate feedback on the basis of their choices. In addition, Spelling Bee enables children to practice at the keyboard and teaches them familiarity with the computer. While somewhat cut and dry, Spelling Bee's time-honored approach should bolster a youngster's spelling ability. *(MECC, 3490 Lexington Ave. North, St. Paul, MN 55126. C-64/$19.95.)*

—JOHN DIPRETE
CRANSTON, RI

BUILDING PERSPECTIVE ..... B

A Challenge to Students' Spatial Perception

Sunburst specializes in non-cutesy software that appeals to many different types of thinking people. A multi-perspective, problem-solving game, Building Perspective gives students (fourth-grade age or older) a look at a collection of skyscrapers from the front, back and side, as though they were walking around the block. Then, they are asked to predict the view of the buildings from above.

The buildings, rectangular in shape, vary in height and color, and appear in narrow, upright form. Depending on the choice of play, they're grouped into one of three possible arrays: three by three, four by four, or five by five.

The screen reveals each lateral view in progression, showing the shapes from all sides. Sometimes, one side of a column shows only one or two buildings, with one of them blocking the view of one or more smaller ones. Two or more buildings of the same color, when viewed head on, appear to be only one building. A student can "remove" a building from a row to get a peek behind it. The goal is to predict the color pattern of the final, top view of the array.

Some of the best features in Building Perspective are the spatial visualization it requires, the vivid colors—up to nine—for the buildings, the sharp tones whenever a color appears and the ease of play.

However, I was frustrated by my inability to backtrack the cursor over a choice I had made; I frequently felt stuck, because my mistakes couldn't be changed. I also object a bit to the game's similarity to The Factory, Sunburst's leading educational game. Although in different form, both teach the same skills.

Building Perspective is packed in a looseleaf, notebook-style binder, and includes directions and work sheets (the latter designed for younger students who might want to put their thoughts down on paper).

I recommend Building Perspective, ►

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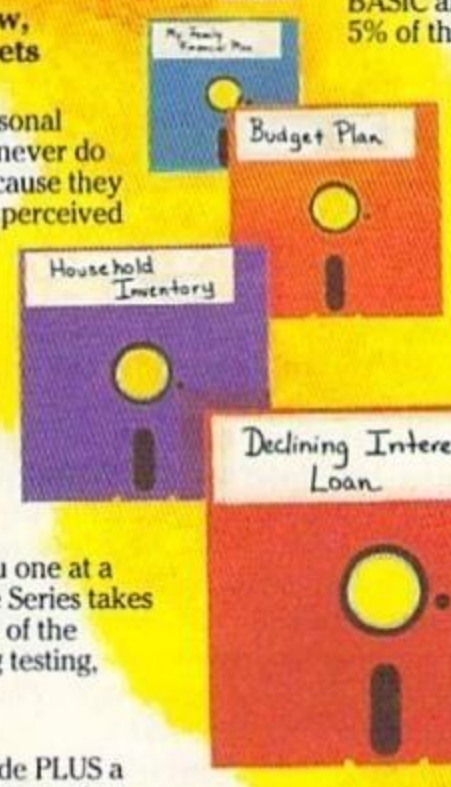

Make no mistake. Almost all books and courses on "programming" teach you only the final 5% of the total programming process—namely, how to code in a specific language. . . information of little value if you don't know how to reach the point in the programming process when you are ready to code.

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but perhaps students would derive the most benefit from it after they had tried The Factory. *(Sunburst Communications, Inc., 39 Washington Ave., Pleasantville, NY 10570. C-64/$59.)*

—JOHN DIPRETE
CRANSTON, RI

TIGER'S TALES ..... C+

Start Reading Comprehension at an Early Age

As Saturday morning television amply illustrates, young children enjoy stories about animals. In this tradition, Sunburst Communications has published Tiger's Tales, a combination entertainment/learning program dealing with the gentle adventures of a winsome cat.

Offered for either home or school use, the software is geared to a 1.3–1.5 reading level and is intended for students in kindergarten through second grade. The program supports a joystick, the keyboard or a device called the Muppet Learning Keys, which is also available from Sunburst for $99. (Although Big Bird and his friends star in other Sunburst products, the Muppets do not appear in Tiger's Tales.)

The software is designed to develop skills in vocabulary, comprehension, picture recognition and problem-solving. Its main feature is the non-threatening presentation of core words that students should know before entering second grade.

There are two separate sections to each of five different adventures in Tiger's Tales. In the Words sections, a child tries to match one of three words to a picture. If he or she succeeds, Tiger appears in a short animated sequence. If the student picks the wrong word, the incorrect choices are crossed out leaving only the right answer. After a child has been tested on ten words, the program repeats all of the missed word/picture combinations.

The Words sections contain much of the vocabulary that is used in the Story sections, which are from five to 13 screens long. On each of these screens, the student guides Tiger through an adventure by selecting one picture out of a group of three. While a screen occasionally offers branching options for which there is no one proper response, the only correct answer is usually the representation of a word that's shown in the last line of text. In these situations, the pupil gets three attempts before the program moves on. At the end of each Story segment, characters from the tale reward the child with an animated scene.

On the one hand, the software has much to recommend it. It was developed according to sound educational principles. Also, its thorough documentation and helpful screen instructions ensure trouble-free operation for parents or teachers.

Pig is Tiger's friend.
Pig asked Tiger to come over and play.
How will Tiger get to Pig's house?
Pick one with the ⇒ key. Press RETURN.

Here's part of one of the story adventures in Tiger's Tales.

However, its bland graphics and sound effects will bore most children, at least those who have previously been exposed to video games. Although Sunburst has done an admirable job to a certain degree, its product in some ways resembles a bowl of plain oatmeal. It is definitely wholesome and nourishing, but it fails to generate much enthusiasm. *(Sunburst Communications, Inc., 39 Washington Ave., Pleasantville, NY 10570. C-64/$65.)*

—MARILOU LATOCHA
OAK PARK, IL

ALPHABET CIRCUS ..... B+

Now I Know My ABCs, Tell Me What You Think of Me!

Although DLM's products have earned an excellent reputation among teachers, not as many parents currently recognize the company's name. However, with its Alphabet Circus home learning program, DLM takes another solid step toward becoming as highly regarded in households as it is in schools.

Intended for children under seven, Alphabet Circus's six activities acquaint youngsters with alphabetical order, letter recognition, keyboarding skills, text creation and problem-solving.

Meet the Circus is the easiest exercise on the disk. In it, the Ringmaster shows the letter that corresponds to any key that the child has pressed. He then displays a picture of a circus item that has a name beginning with that letter.

Another program segment, Alphabet Parade, has the player watch the ABCs appear in a parade. When it pauses, he or she must find the letter that comes next.

Secret Letter starts with the Ringmaster choosing a character. Two players take turns using on-screen clues to guess the letter.

In Juggler, the title character tosses a letter upward. The child must, within a time limit, press the key that matches it. The software automatically adjusts the game's speed to the youngster's performance, and there is a high-score display that serves as a constantly changing goal for the player.

Marquee Maker turns the C-64 into an electronic blackboard. The child types a word or phrase and then presses the space bar to make his or her message flash on the screen in large, colorful letters.

In Lost Letter, the computer shows a circus character's picture, and the boy or girl must choose the letter that it represents. If the child misses, the character's name appears as an additional hint. As in Alphabet Parade and Secret Letter, a scoreboard screen periodically uses pictures to summarize the results of play.

Each part of this program is an effective learning tool, with the possible exception of Marquee Maker. That section's splitting of words longer than six letters can confuse some children.

Reflecting the sound educational principles that generally went into the software, Alphabet Circus's instruction manual is excellent. It gives clear descriptions of each activity's features and indicates how to get the most benefit from them. The program's graphics and sound elements are also good, although not quite state-of-the-art.

Parents who wish to expose their children to enjoyable exercises that teach the ABCs and keyboarding skills should consider Alphabet Circus. On the whole, this software has the same high quality that DLM has been offering professional educators over the last 15 years. *(DLM, One DLM Park, Allen, TX 75002. C-64/$29.95.)*

—MARILOU LATOCHA
OAK PARK, IL

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REGIONS OF THE UNITED STATES C

Tell the States
By Their Shapes
And Spell 'Em, Too!

Much moaning and wailing has been heard in recent years over our nation's appalling ignorance of United States, let alone World, geography. Well, Regions of the United States is a software program for the C-64 that seeks to help redress the situation, albeit rather simplistically.

Completely menu- and prompt-driven, Regions instructs and quizzes by means of outline maps of the states within seven regions: New England, Mid-Atlantic, South, Midwest, Great Plains, Western Mountain and Pacific. Users can enter their names, and quiz scores are kept.

The program is in two parts. The first, dealing with states, lets you choose to review the states in each region, take a beginner's quiz or take the super quiz. In the 20-question beginner's quiz, you see a region and a numbered list of the states therein. You are to identify by number the state containing a flashing question mark. The super quiz presents you with the same picture, but without the list. You get credit for a right answer only by typing in the name of the state—and *spelling* it correctly!

The program's second part, also containing a review and quiz, is concerned with region recognition. Here, the quiz gives you clues—up to three, if at first you don't succeed—involving geographical characteristics, natural resources, population, manufacturing, and so on. As with the states, you choose from a numbered list of the regions.

That's all there is to the program. It's not very exciting, nor even much of a challenge for anyone who has a close acquaintance with the map of the U.S. It is adequate for its purpose, yet one shortcoming is less than no help to the disoriented beginner: Except for the western states, where boundaries are relatively straight both in the north-south and east-west directions, the state outlines are graphically crude in the extreme. They are recognizable if you already know the shapes, but I would consider it an educational crime to let a child try to learn state shapes from this program. Long study of a good conformal map—even a Mercator is too distorted—should precede use of this program.

Learning geography is the name of the game in Regions of the United States.

To me, one other negative aspect was the length of loading times. You're asked to "wait a moment" at every shift to another part of the program, but the moments seem to become minutes. A quibble, I guess, but annoying.

It also occurred to me that the designer missed an opportunity to make the program far more valuable and interesting by including the state capitals and other major cities. *(Educational Activities, Inc., PO Box 392, Freeport, NY 11520. C-64/$59.95.)*

—SWAIN PRATT
RUN STAFF

PATH TACTICS ..... B

Racing Robots Teach
Problem-Solving Math

Path Tactics is a basic arithmetic drill in the form of a maze game. Children of suggested ages 5 through 12 can select from seven levels of math problems that involve combinations of counting, addition, subtraction, multiplication, division and the use of negative numbers. Youngsters of two different ages can play against one another by adjusting the skill levels, and one person can even win playing against the computer, for it always uses the same level as the player!

The goal of Path Tactics is for play- ►

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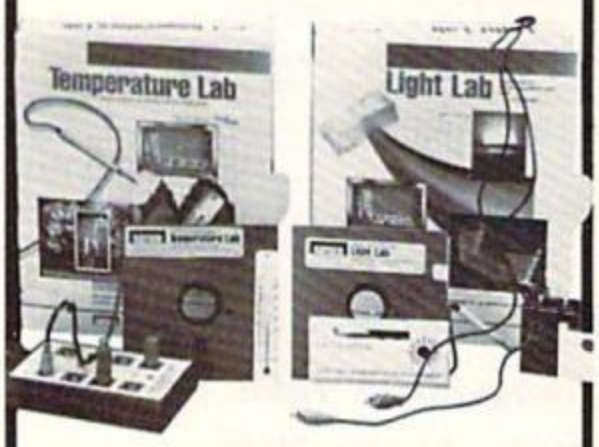

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ers to get their robots to the finish line in the least number of moves. The student solves the on-screen problem, and his or her robot moves that many spaces along the path within the maze. If a wrong answer is presented, the correct one is displayed, and the turn is lost.

There is room for development of skill and logic here: The numbers can be manipulated to land a robot on a certain space along the path. Some spaces are trap doors and when a robot lands on one, it's automatically advanced. A player can also try to land on the same space as his or her opponent, which bumps that robot back ten spaces. Appropriate light musical notes are played at all times, and, at the winner's space, there's a short, jazzed-up rendition of Mussorgsky's "Pictures at an Exhibition"! The robot smiles at the winner, and the list of high scores is written to disk.

The documentation is short and to the point, but really unnecessary, because there are on-line instructional screens available. There's even a demo that shows the game in action. Only the space bar, return and number keys are used; knowledge of the rest of the keyboard is not necessary.

The only fault I could find with this software is that, like most programs with graphics, it takes a long time to load; but a fast-load cartridge can fix that.

This product is a fine drill program for children, but it is missing the animation and energy that distinguishes a true "grade A" product. However, it's an amusing, reliable package that makes the process of learning arithmetic easier and a little more pleasant. *(MECC, 3490 Lexington Ave. North, St. Paul, MN 55126. C-64/$19.95.)*

—EDITH CHASEN
WOODHAVEN, NY

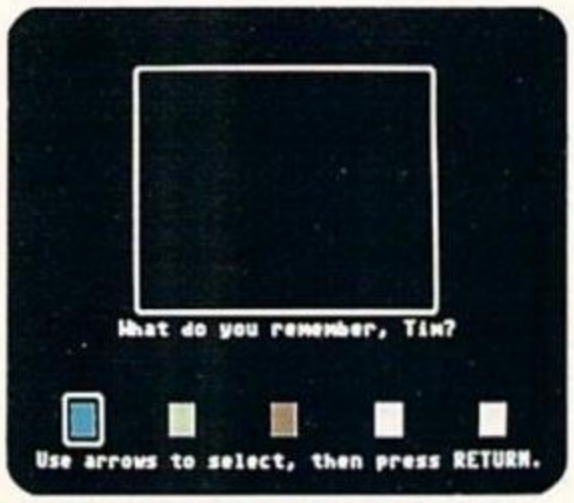
SIMON SAYS ..... C–

Simon Says Students Will Recognize and Memorize

Simon Says is intended for classroom learning from first through sixth grade, but these assignments can be modified for other learning levels. The game supports either the keyboard or, like Sunburst's Tiger's Tales, the Muppet Learning Keys. The software's goal is to provide practice in memory-chaining strategies, which the designers consider to be an important skill for problem-solving.

A teacher must load and start Simon Says at the beginning of each session. Either the instructor or from one to four players can decide whether the sound will be on, how long the wait will be between displays of objects, and whether students or the computer will set the order in which objects appear.

Students can choose to be challenged by numbers, letters or colors. No matter which category is selected, the computer begins by showing one object, erasing it, and asking a player to indicate what it was. Whenever a pupil answers correctly,



Remembering colors is just one aspect of Simon Says.

the program goes on to the next round, which repeats what has gone before and then adds another object. If a student makes a mistake in a multi-player game, he or she automatically drops out, and an error ends a single-person contest. In either case, the pupil who gave a wrong response is given an opportunity to view the correct sequence of items.

Like Tiger's Tales, Simon Says suffers from lackluster graphics and sound. But, on a positive note, the software is very easy to use, primarily because of a clearly written teacher's guide. In addition to describing the software's operation, the manual devotes 20 pages to three lessons that provide practice in chaining without using a computer. Unfortunately, the lessons are no more interesting or innovative than the program's sensory effects.

However, if a teacher believes in a heavy emphasis on chaining exercises, he or she can use to good advantage the one solid attraction of Simon Says: The game elements that the software shares with its playground and handheld electronic predecessors should generate interest in most students who are exposed to it. *(Sunburst Communications, 39 Washington Ave., Pleasantville, NY 10570. C-64/$65.)*

—MARILOU LATOCHA
OAK PARK, IL

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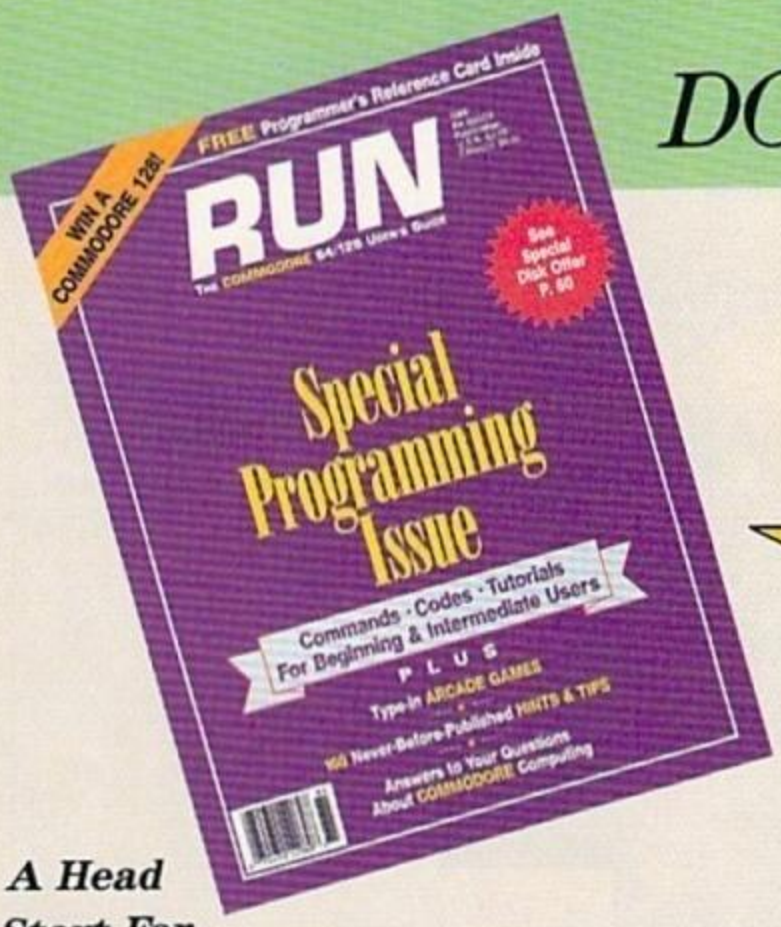
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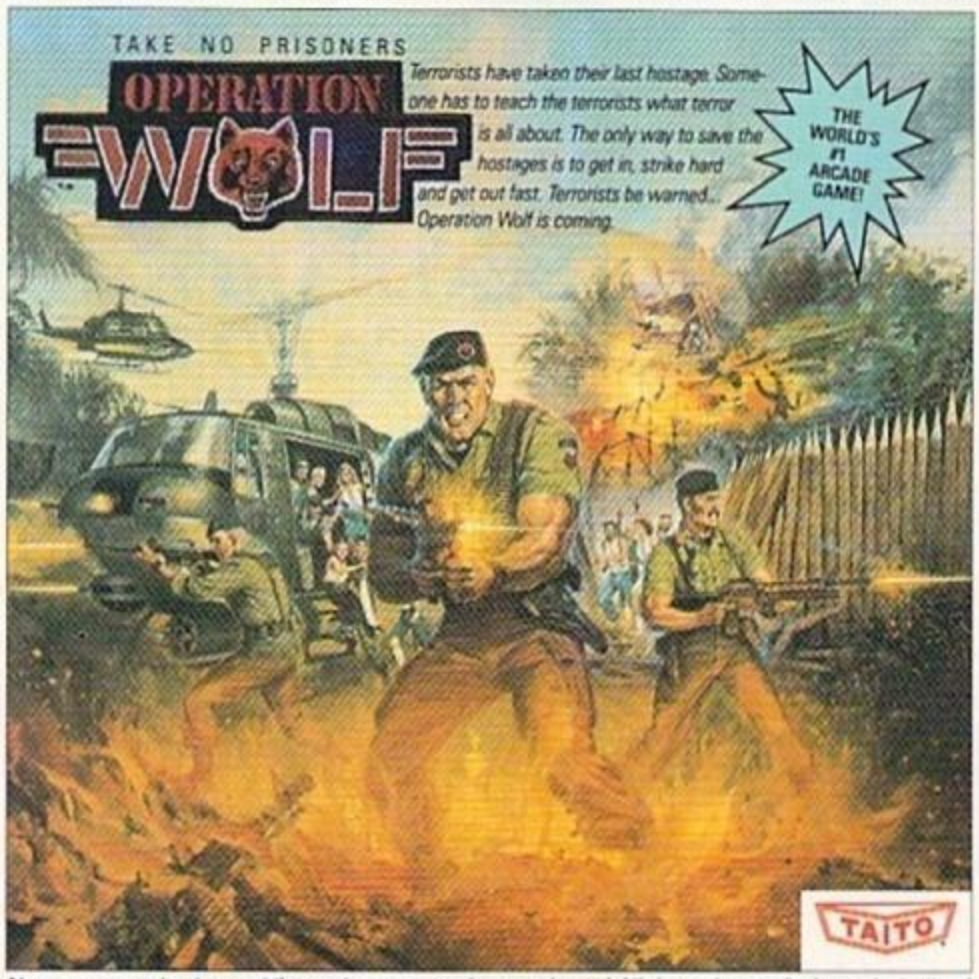
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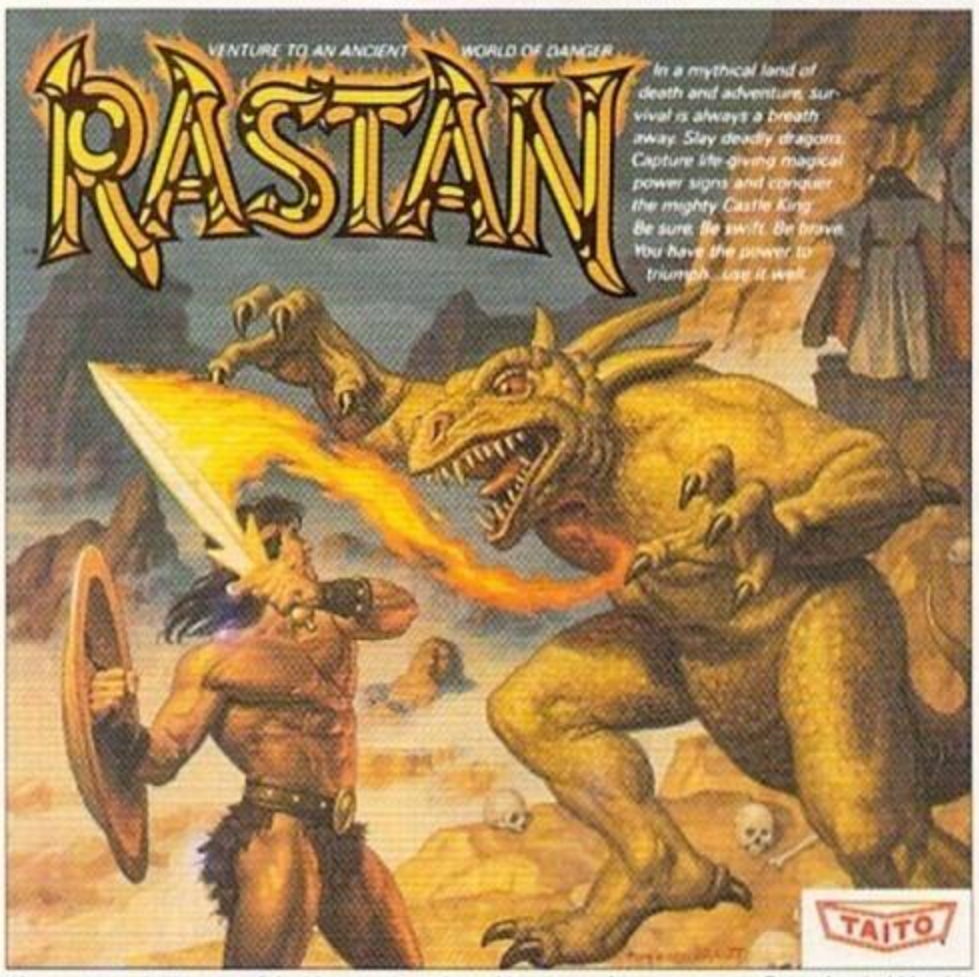
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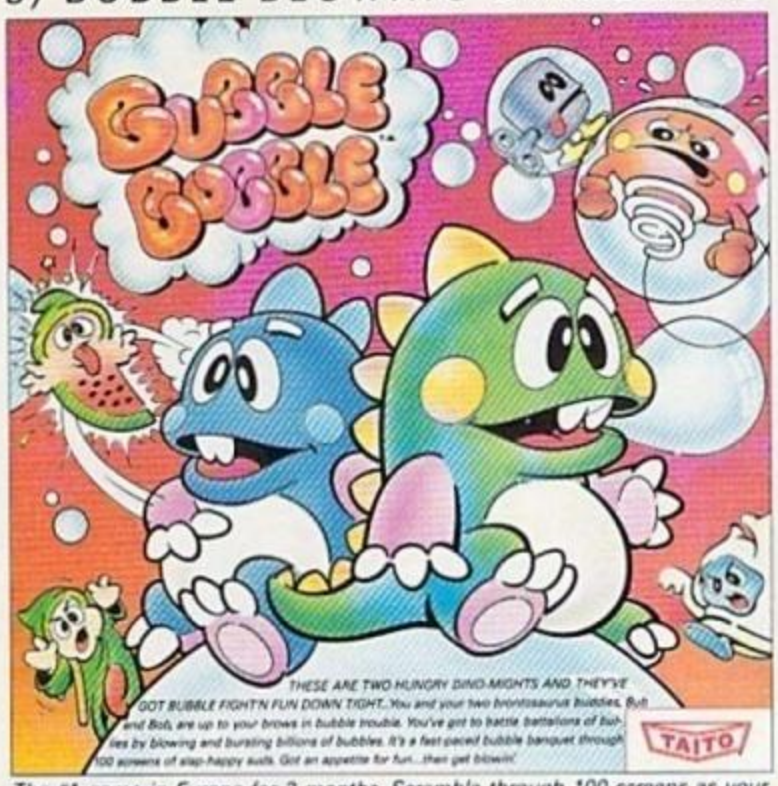
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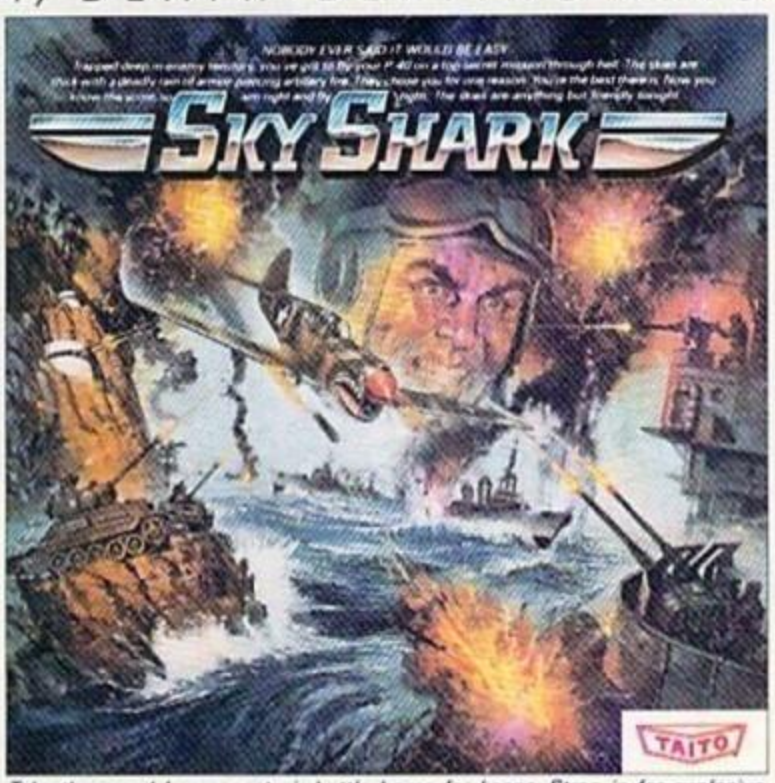

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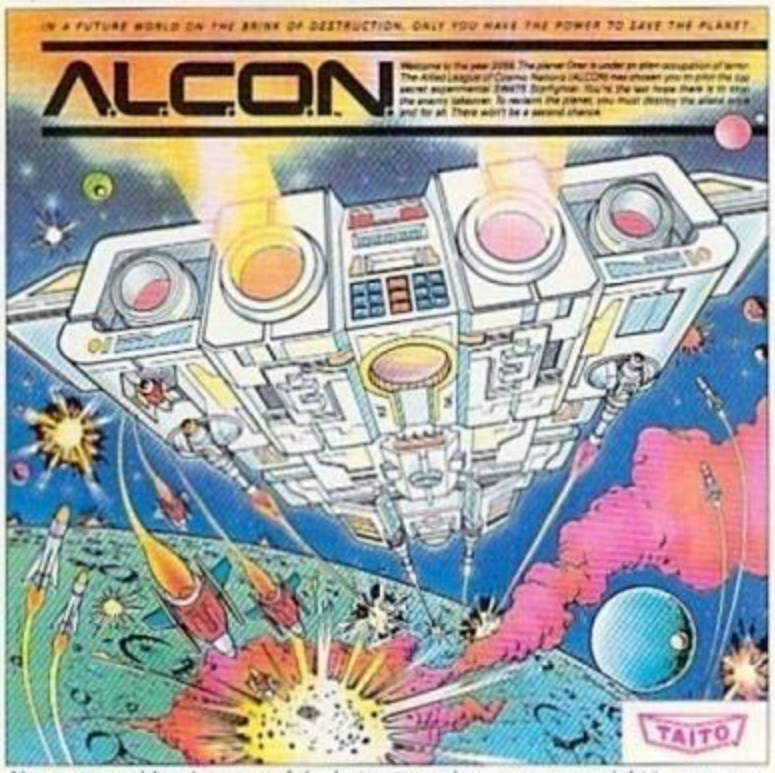
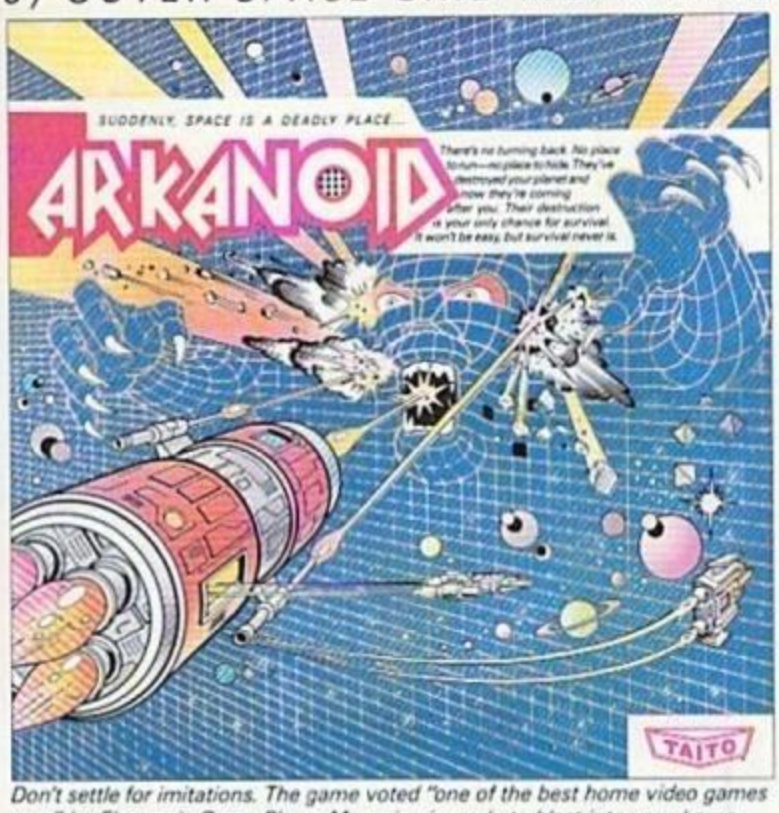


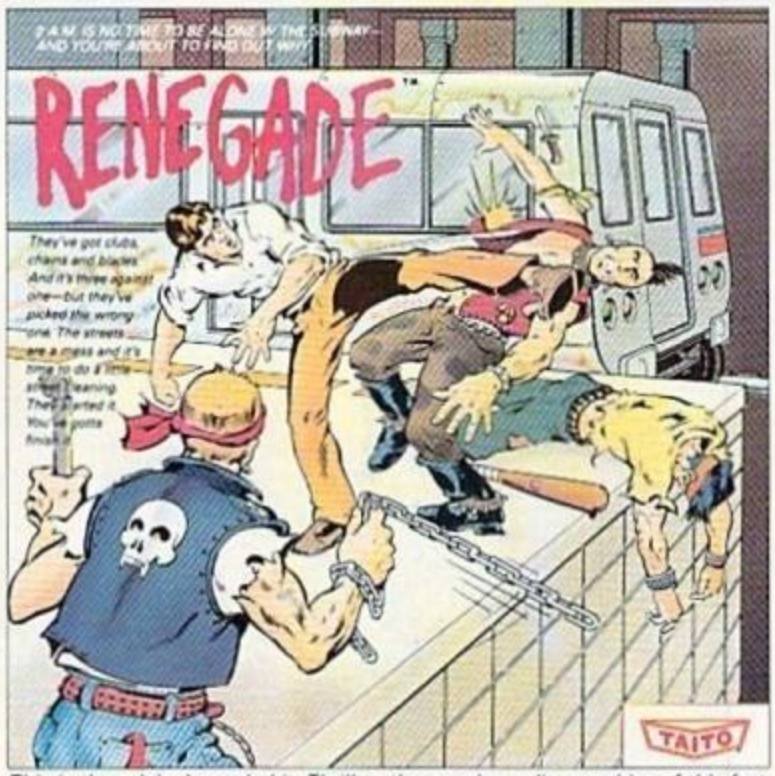
Now you can blast into one of the hottest arcade space games right in your own ... You've never seen action like this.

6) OUTER SPACE GRID MONSTERS.


SUDDENLY, SPACE IS A DEADLY PLACE...
ARKANOID
There's no turning back. No place to run—no place to hide. They've destroyed your planet and now they're coming after you. Their destruction is your only chance for survival. It won't be easy, but survival never is.
TAITO

Don't settle for imitations. The game voted "one of the best home video games ever" by Electronic Game Player Magazine is ready to blast into your home.

7) RAGING STREET RUMBLES.


2 A.M. IS NOT TIME TO BE ALONE IN THE SUBWAY—AND YOU'RE ABOUT TO FIND OUT WHY!
RENEGADE
They've got clubs, chains and blades. And it's three against one—but they've picked the wrong one. The streets are a mess and it's time to do a little street cleaning. They started it. You've gotta finish it.
TAITO

This is the original arcade hit. Thrill to the arcade quality graphics of this fast-paced, street-style karate brawl. Find out what real action is all about!

Taito games will make your Commodore scream with the sights and sounds of arcade action, adventure, survival, destruction, heroes, villains and heart-pounding thrills.

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Printers on Parade

RUN's resident printer expert takes you on a tour of what's currently available in 9- and 24-pin printers.

Quite a few changes have occurred since *RUN* published my last roundup of printers ("In Search of the Perfect Printer," May and June 1986). Some models have faded into oblivion, while others have entered the marketplace, but perhaps the most significant development is that many computerists now consider a printer a necessity, not a luxury.

Those who use a computer primarily for work require a printer for spreadsheets, databases and most other business software; programmers find one essential for debugging program listings; and, of course, a printer is a must for word processing. Desktop publishers become experts at controlling printers as they turn out newsletters and other documents brimming with fonts, digitized images and fancy graphics, all in multicolumn format.

A wide variety of printers, both simple and fancy, is currently available. Computerists rarely achieve striking results with a feeble Commodore 1525 or MPS-1526; on the other hand, those who equip their Commodores with laser printers are usually disappointed that so little software exists. If you want both quality output and Commodore software compatibility, you need a printer that falls between those two extremes—namely, a good quality dot matrix machine.

You don't have to pay big bucks for a dot matrix printer, but, as my examination of high-end units reveals, it sure helps. If you're scouring the discounters' brochures for a printer under $100, be careful. Low-budget machines tend to have poor print quality and to be painfully slow, only marginally reliable and lacking in those features—Near Letter Quality (NLQ) mode, for example—that experienced users take for granted. Better to ►

By TIM WALSH—Technical Editor

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spend some serious money for a serious printer, so you can take pride in your hard copies.

Consider a Twenty-Four-Pin

Nine-pin printers have been popular among Commodore owners for quite a while, but the Commodore community is beginning to realize that the fast, heavy-duty, 24-pin printers also work well with a wide range of C-64 and C-128 software—and their prices are declining. The 24-pin machines still average over $750, but the cost is justified by a wide range of features and superb print quality. (For novices in the printer realm, the 9 and 24 refer to the number of pins that appear vertically on the printhead. The greater the number of pins, the higher the resolution. For more explanation of printer terminology, see the glossary later on in this article.)

A commonly asked question is why any C-64 or C-128 user should invest in a 24-pin when a speedy 9-pin printer will satisfy his needs. Well, checking performance numbers (print speed, graphics, print modes, and such) doesn't always reveal the whole story.

Comparing a garden-variety 9-pin to the typical 24-pin is like comparing a VW Bug with an 18-wheeler. Twenty-four-pin printers are designed to withstand continuous, heavy-duty office use, so they are sturdier and generally more reliable than most 9-pins. For instance, the printhead on the 24-pin Okidata Microline 393 is almost the size of a doorknob and is bolted together with about a dozen heavy machine screws, while your favorite 9-pin's printhead is probably not much bigger than a thimble.

Twenty-four-pin printers are generally faster. They also offer a wider range of printing capabilities and feature highly condensed dot matrices that result in what are known as letter-quality characters. In fact, they've all but made the daisywheel obsolete.

Software compatibility is the primary variable that should determine whether a given 24-pin printer and interface you're considering for your Commodore will keep you happy. All the graphics in this article were created with the printer in Commodore-compatible Epson mode, thus using similar printer codes to set the dot density, line-spacing and other parameters. Make sure the printer of your dreams possesses an Epson mode—preferably Epson LQ. (An IBM or other mode is an extra, but not a compelling reason for buying the printer.)

I've seen a growing trend away from the manufacture of printers equipped with Commodore-ready serial ports. Anyone who's spent a good deal of time using various printers with the C-64 and C-128 is likely to tell you that a good-quality parallel printer opens up a wide range of print pitches, fonts and other options—not to mention high-resolution graphics—that owners of most Commodore-compatible serial printers can only dream about.

The rest of this article reviews a mix of well-advertised 9- and 24-pin parallel printers. These brief overviews will give you my general impressions and an idea of how well the various machines work with Commodore computers. You'll have to decide for yourself which one best meets your needs.

I'm fully aware that I'm not covering some popular printers that are probably favorites of many *RUN* readers. Regrettably, several manufacturers didn't respond in time to our requests for review units, so you'll have to stay tuned to *RUN*'s Hardware Gallery for in-depth coverage of their products.

In the chart that accompanies this article, you will find features, specifications, prices and dimensions of the printers reviewed below. The names and addresses of the manufacturers are listed in Table 1.

Table 1. Manufacturers' addresses.

PRINTERS:

SK-3000
Seikosha America, Inc.
1111 Macarthur Blvd.
Mahwah, NJ 07430

KX-P1092i
KX-P1524
Panasonic Computer Products Division
One Panasonic Way
Secaucus, NJ 07094

Microline 183
Microline 393
Okidata
532 Fellowship Rd.
Mount Laurel, NJ 08054

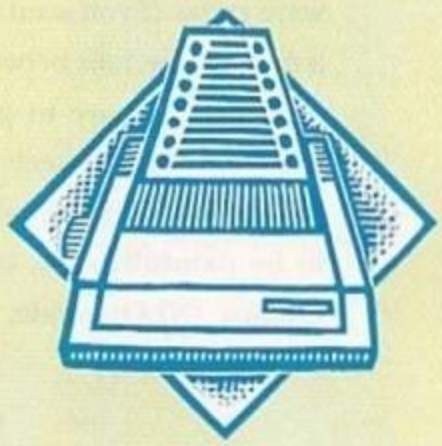
Brother M-1724L
Brother International Corp.
8 Corporate Place
Piscataway, NJ 08854

Epson FX-850
Epson America, Inc.
2780 Lomita Blvd.
Torrance, CA 90505

INTERFACES:

Hot Shot Plus; $99.95
Omnitronix Inc.
760 Harrison St.
Seattle, WA 98109

Super Graphix Gold; $119.95
Xetec
2804 Arnold Rd.
Salina, KS 67401



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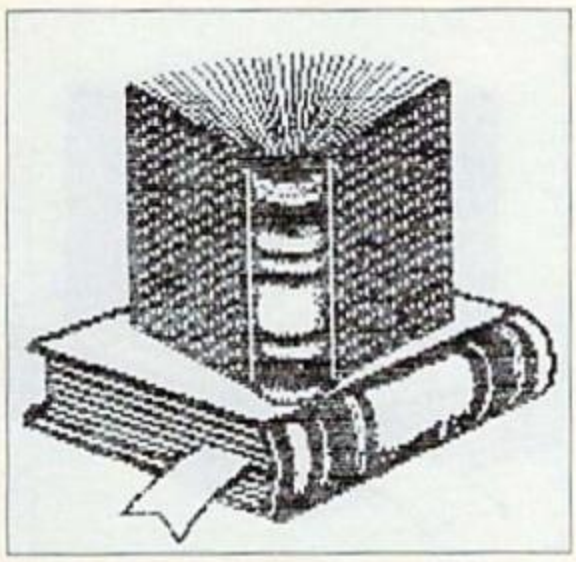

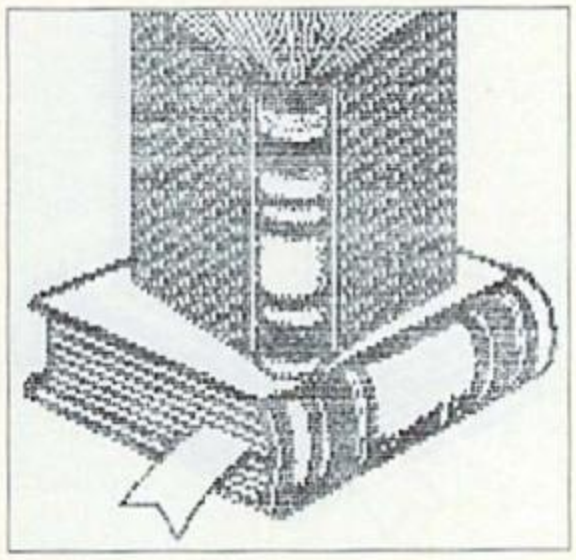

Sample clip art produced by using GEOS 128, as printed by each machine.

Bewildering the Fans

◆ The Seikosha SK-3000 ◆

Seikosha's popular SP-1000 series of low-end printers has won a strong following among Commodore users over the past few years, selling as well or better than most other printers. Now, however, Seikosha is changing its tactics and aiming at higher-end computers with its more elaborate—and expensive—9-pin SK-3000 series. Color printing capabilities and printing speed are the most noteworthy new features found in these machines.

RUN's resident graphics guru, Lou Wallace, adopted my SK-3000 review unit and reported it works well with graphics. I found that it works well with text software, is one of the speedier 9-pins (300 cps draft/75 cps NLQ) and offers a multitude of print options.

Foremost among the print options are two IBM modes and character sets, and, as in the other Epson-compatible printers in this roundup, single-, double-, double-speed double- and quadruple-density Graphics modes. The RGB Graphics mode permits programming of individual dots in seven colors (black, orange, green, yellow, purple, red and blue).

On the negative side, when printing in either color or black with the color unit installed, the SK-3000 generates an odd combination of low-volume whooshing and whining noises. Also, it uses one of the largest, bulkiest ribbon cartridges I've ever seen in a 9-pin printer, and the tractor feed unit is of the out-dated pull-instead-of-push variety. I wonder why the SK-3000 didn't inherit the simple and quiet operation of the Seikosha SP-1000. If you do not mind some noise when printing colors, though, this might be the printer for you.

Pros: Fast; Epson-compatible; color capabilities; long list of print options.

Cons: Noisy; expensive; bulky ribbons.

If 9 Is Good, Must 24 Be Better?

◆ The Panasonic KX-P1524 ◆

Panasonic's contribution to the 24-pin printer field is the KX-P1524. Like the 9-pin 1092, this machine prints at a maximum speed of only 240 cps, but its 67-cps Letter Quality mode produces characters of better quality than the 1092—no small feat.

In its default mode (Epson LQ-1500), the 1524 offers a wide range of print options and is easy to interface to a Commodore, since it can be programmed as (you guessed it) an Epson-compatible printer. Eight character sizes, two IBM character sets and letter-quality and draft fonts are available in IBM Proprinter mode. A Diablo 630 mode is included in the 1524, as well, and seven optional font cards can be purchased separately.

Print-wise, the KX-P1524 wins my admiration for both its beautifully detailed letter-quality characters and its ability to work flawlessly with all manner of graphics software for the C-64 and C-128. Its documentation, a large, bound operating instruction booklet, contains a wealth of information. As to design, the 15-inch carriage makes this printer a fairly wide, hefty piece of equipment (in fact, among the units in this roundup, it's second in size only to the massive Microline 393). The price? Let's just say I paid less for my first and second automobiles combined—but, then, they had only a fraction of the KX-P1524's life expectancy.

Actually, the 1524 is reasonably priced, and, in every respect, it's a sophisticated piece of hardware that would complement any Commodore computer system.

Pros: Excellent construction; Commodore-software friendly; possibly the best 24-pin letter-quality characters; good paper handling.

Cons: Expensive (compared to 9-pin printers); large; slower than some 24-pin printers.

Printer Interfaces

WHETHER YOU'RE BUYING your first printer or upgrading to a faster, more sophisticated unit, you may need to decide if you want a Centronics parallel or a Commodore-compatible serial printer. A serial printer uses a 6-pin DIN connector, just like a Commodore disk drive, as a direct connection to your C-64 or C-128. A parallel printer, such as all those mentioned in this roundup, requires a Commodore-compatible printer interface.

Choosing such an interface is easy nowadays, because you can count on the fingers of one hand all the manufacturers marketing them. A few years ago, dozens of companies were selling Commodore-compatible interfaces, but most have dropped from the scene. Fortunately, many of their products are stockpiled at mail-order houses and can be purchased at bargain prices. If the price is right, and the interface sounds as though it would do the job for you, go for it.

On the other hand, if performance and features are more important to you than price, read on. Two of my favorite interfaces, both introduced this year, are the Hot Shot Plus, from Omnitronix, and Super Gold, from Xetec. Both are top-of-the-line units, employing the latest technology and offering a wide range of print features. They'll enhance your printer's capabilities and provide a level of user-friendliness that older, lesser interfaces simply can't match.

The Hot Shot Plus is my favorite of the two. Selling for $99.95, it provides access to a host of features by toggling DIP switches on and off, and it lets just about any printer emulate a Commodore 1525/MPS-803, for maximum software compatibility. Moreover, you'll find built-in fonts, a font editor, an enhanced Graphics mode—and the list goes on. For an in-depth Hardware Gallery review of this interface, see the July 1988 issue of *RUN*.

Xetec's Super Graphix Gold is also a capable interface. Two features—rocker-type DIP switches and a separate power supply—distinguish this flashy unit from the Hot Shot Plus. At $119.95, the Graphix Gold also provides an excellent Commodore-emulation mode, various fonts and enhanced graphics and text printing, just to name a few features. We'll have a review of this interface in an upcoming issue of *RUN*. R

—TW

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Pointers on Printer Use

GETTING A FANCY 24-pin printer to print text with a C-64 or C-128 is easy, because most interfaces include a Commodore-emulation mode. However, occasionally you'll encounter a software compatibility problem. When such troubles arise, don't panic. Instead, just set your interface to Transparent mode and use true ASCII text output (provided in most commercial software packages).

In case you're wondering how I generated the graphics accompanying this article, I placed the interface in a combination of Epson-emulation and Transparent modes, the latter to prevent unwanted codes from travelling to the printer. I also wrote a program for each printer to set it into Epson mode (if necessary), to choose either 9- or 24-pin mode, and to specify the dot density in the Graphics mode that works best with that printer and software.

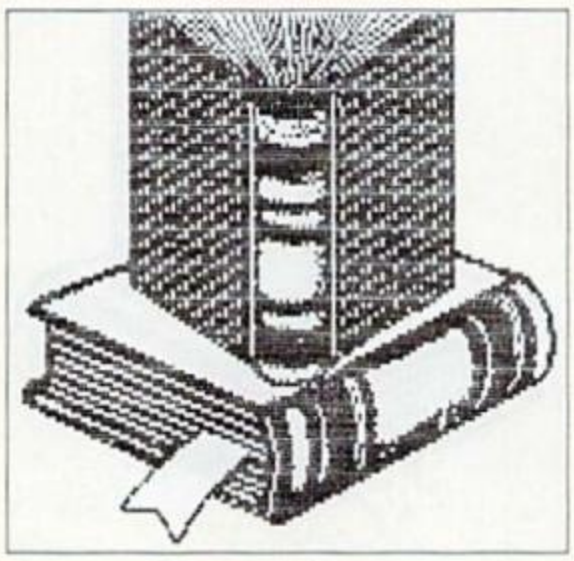
I wrote programs to preselect line spacing, too. Most Epson drivers in software packages take care of this, but I find that by writing my own program, I can give the graphics better proportions; if the line spacing is too tight, the graphics are flattened and lines overlap, but if it's too great, gaps appear in the graphics and they tend to become oblong.

Most of the printers in this lineup provide line spacing in Graphics mode in increments of $^{1}/_{216}$ inch. The exception is the Okidata Microline 183, which provides only $^{1}/_{144}$ inch. For most graphics, you'll get good results in the $^{22}/_{216}$ to $^{27}/_{216}$ range. For instance, with geoPaint 128, $^{24}/_{216}$ line spacing is just about perfect.

Setting the mode(s), dot density and line spacing is a trial-and-error process the first time you set up your printer and software. You may want to take a cue from me and, using examples in your printer manual, write a short program to set your printer in the configuration that produces the best results. Then save the program to disk and run it each time you activate your graphics software.

The most valuable advice I can give newcomers to the art of printing graphics is to spend an evening or two learning how to make your printer turn out high-density, proportionally correct graphics, because the output of Commodore-emulation mode is certainly mediocre by comparison. R

—TW



It Ain't Heavy; It's My Brother

◆ The Brother M-1724L ◆

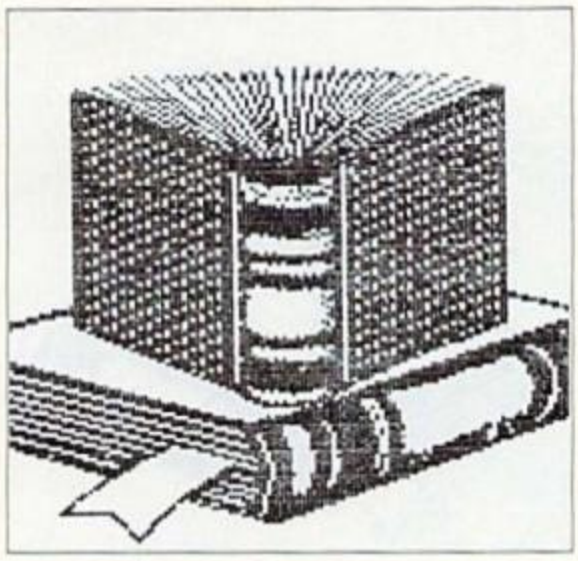
Brother, the foremost maker of daisywheel printers and typewriters, also makes one of the Commodore software-friendliest 24-pin dot matrix printers on the market—the M-1724L. At 216 cps in Elite Draft mode, this unit is slow for a 24-pin printer, and its NLQ print is barely distinguishable from that generated by top quality 9-pin printers, but it's got strong points that make it a great 24-pin machine.

It's commendably small for a 24-pin unit with a 15-inch carriage, and its styling is clean, simple and thoroughly modern—unlike some 24-pin printers that borrow heavily from older designs. It also offers a sophisticated, built-in, tractor-feed mechanism, on which you can "park" continuous forms while you're printing individual sheets of stationery. Not only did the M-1724L work well with all the Commodore software I tried with it, but it offers Brother HR/Diablo and IBM Proprinter XL emulation in addition to its default Epson LQ-1000 configuration. Eight graphics densities, in both 8- and 24-pin modes, make for flexibility.

The M-1724L is easily programmed if you use the 116-page, bound owner's manual as a guide. It also produces graphics that rival the output of any printer in this lineup for darkness and accuracy. Best of all, the controls feel tight and precise. If Brother increases the print speed and fine-tunes the Letter Quality mode, they'll have one of the best printers on the market at any price.

Pros: One of the smallest 24-pins available; sleek modern design; quiet; superb construction; software-friendly; wide range of printing capabilities; excels at paper handling.

Cons: Expensive, compared to 9-pin printers; LQ print more closely resembles NLQ print in 24-pin mode; generally slow operation.



Aging Gracefully

◆ The Okidata Microline 183 ◆

I started using this 9-pin printer about the time I mentioned it in the RUNning Ruminations column last April, and I've been happily using this 1985-era machine ever since. When connected to a Commodore through an interface offering an Okidata mode, which most do, it prints hi-res graphics and text without any problems, even though it lacks an Epson-emulation mode.

Its documentation consists of a scant 101 spiral-bound pages—not surprising since the printer doesn't offer a lot of features. However, it does produce super- and subscripts, nice NLQ characters, single- and double-density graphics, underlining, and more.

I have only two complaints of any substance concerning this printer. Twice, when I pressed the linefeed button too rapidly, it protested by breaking its 1.5-amp fuse. The fuse is easily accessed, however, and costs only ten to 25 cents. The other problem is the primitive tractor-feed unit, with a pull, (rather than push) design that occasionally makes labels jam. All in all, though, with the Microline 183 you're getting a lot of printer for relatively little money.

Pros: Very good NLQ characters; relatively quiet; good software compatibility; reasonable price.

Cons: Wide carriage (15 inches) uses valuable desk space; slower and more limited in features than some printers in its price range; occasionally snacks on a fuse; only fair paper handling.

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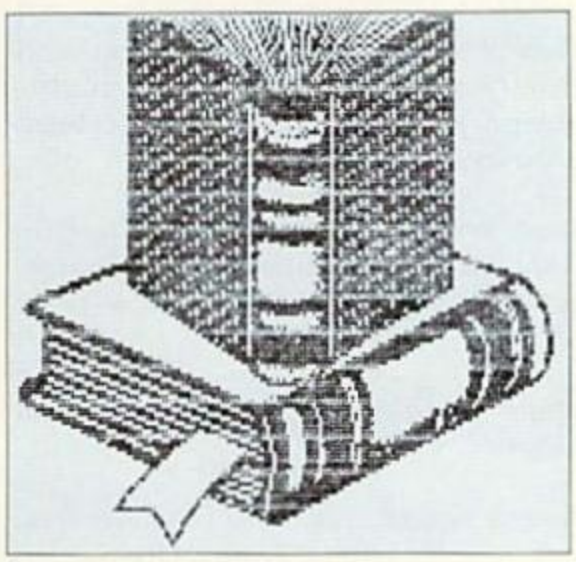


The Arnold Schwarzenegger Of Printers

◆ The Okidata Microline 393 ◆

At the other end of the Okidata spectrum sits the awesome 24-pin Microline 393. A thesaurus of superlatives is needed to describe this bell-and-whistle-laden piece of hardware that dwarfs even the most elaborate C-128D system. The 450 character-per-second (cps) Draft mode of this 15-inch (carriage width) machine is so fast you have to experience it to believe it. It is a noisy machine, but a "Quiet" mode is included to subdue the clatter.

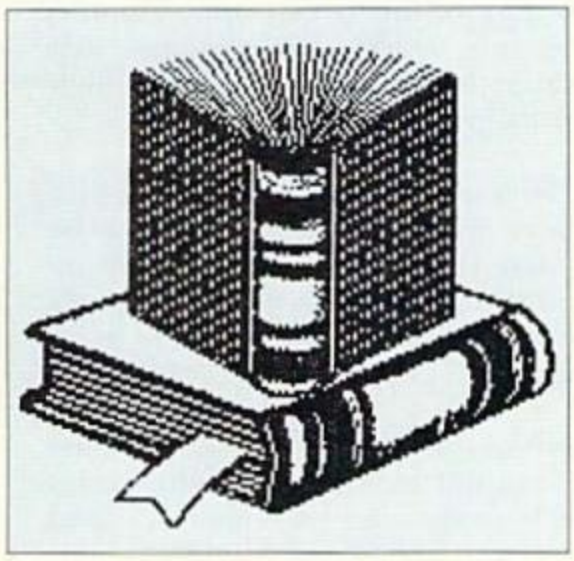
Airline pilots will feel right at home with the 16 LED lights and eight control buttons adorning the 393's control panel, while printer programmers will revel over the seemingly endless lists of modes, menus (yes, menus!) and text- and page-formatting commands. The documentation comprises two thoroughly written user manuals, one for setting up and the other for using the machine.

The print quality in every mode is as good as money can buy in a 24-pin printer, and you'll be surprised at the 393's ability to print things other than text with its Epson LQ series-compatible personality module, which plugs into the front of the unit. For easy production of beautiful graphics, I use a 393 with an Omnitronix Printmaster/+G interface, configured with Epson settings.

Since this colossal machine costs as much as half-a-dozen or more quality 9-pin printers, it isn't a sensible investment for many Commodore owners. On the other hand, if you want your computer to have the biggest, baddest printer in town, go for it!

Pros: Unbelievably fast in every mode; Epson-compatible; software friendly; countless print options.

Cons: Expensive; noisy (when not in the "Quiet" mode); bulky.



Still Slightly Ahead Of its Time

◆ The Panasonic KX-P1092i ◆

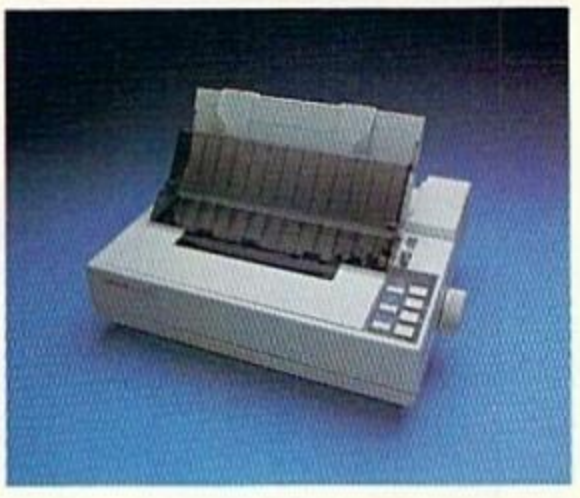
Returning to more common ground, here's a sensible 9-pin printer for the average Commodore user. The KX-P1092i (1092 for short) offers speedy 240-cps performance in Draft mode, two IBM Proprinter modes and single-, double-, double-speed double- and quadruple-density printing. The NLQ characters are nearly as well defined as 24-pin letter-quality characters—proof that Panasonic is still slightly ahead of its time. The documentation consists of an enormous operating instruction booklet, which I found very helpful for programming the printer.

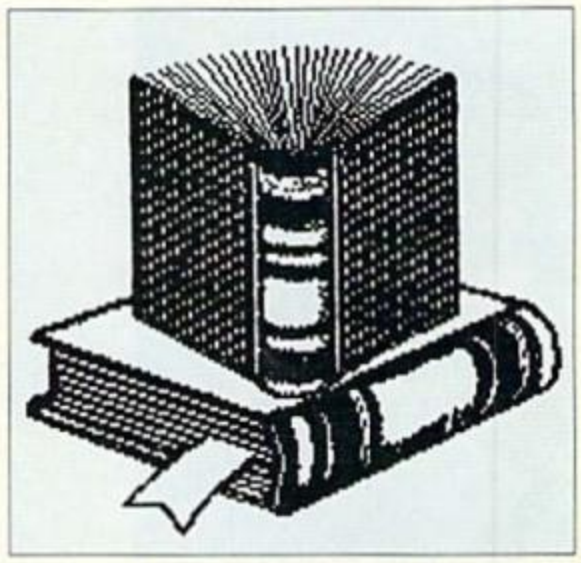
As to software, most programs fare well with the 1092. Set your interface in Panasonic or Epson mode, and the 1092 will respond correctly to most commands. As proof, using GEOS 128 and the 1092 in quadruple-density Graphics mode with an Omnitronix Hot Shot Plus interface in Epson mode, I printed scores of GEOS graphics with nary a hitch.

Like all the Panasonic printers I've used, the 1092 excels at mailing labels. Just get a sufficient number of them, align the first few in the adjustable built-in tractor unit, then sit back as endless streams of labels appear. This printer is one of the best you can get for the price.

Pros: Fast; multiple modes; excellent NLQ; good software compatibility; moderate size.

Cons: More costly than some other 9-pin printers; a bit noisy in NLQ mode.





My Checkbook's Worst Nightmare

◆ The Epson FX-850 ◆

As evidenced by the fact that most of the printers in this roundup strive to be Epson-compatible, Epson is the industry standard, and the FX-850 is proof positive that they still know how to build legendary machines. After spending a little time with the FX-850, I'm certain it has what it takes to leave a lasting mark.

What do I like best about it? Maybe it's the way I can "park" continuous forms while printing single sheets, just like an expensive 24-pin printer. Or maybe it's Epson's SelecType control panel, which lets me press a button to toggle between draft, roman and sans serif fonts, as well as to select 10 cpi, 12 cpi, condensed and proportional print pitches. The printer can even "remember" control panel selections after it's turned off. If you select, say, a sans serif font in a 12-point pitch, and then turn the printer off, those settings come up as defaults when it's turned on again five minutes or five days later.

The spiral-bound user's manual is chockfull of useful information and instructions, more so than any other documentation listed here. I also like the 264-cps print speed in 12-cpi Draft mode and find the 45-cps print speed in NLQ mode fast by 9-pin standards.

Unfortunately, the FX-850 inherited a ribbon cartridge that's long and cumbersome. Epson needs to follow Okidata's and Panasonic's lead in making small, clean, efficient cartridges.

The cartridge problem is minor, though, compared to the FX-850's strengths. This is the print machine I'd place on layaway.

Pros: Excellent construction; top-notch paper handling; rapid printing in all modes; superb software compatibility; SelecType control panel.

Cons: Cumbersome ribbon cartridge; expensive, compared to some low-end 9-pins. ►

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Glossary of Printer Terms

Bit-image density: A calculated combination of Bit-Image (Graphics) mode and dot density (resolution) that represents a printer's ability to horizontally print numerous dots per inch. The significance of this is that some graphics programs won't work properly with printers incapable of producing high-density graphics.

Buffer: Computers can send data to a printer much faster than it can be printed, so most printers store the incoming data in internal memory that's known as a buffer. Buffers range in capacity from 2K to more than 30K bytes.

Characters per inch (cpi): Also called "pitch," this measure represents print size by indicating how many printed characters will fit horizontally in a 1-inch line of text. Common print pitches include 10, 12 and 17 cpi.

Characters per second (cps): A measure of print speed.

Character set: All the letters, numbers and symbols in a particular font.

Control codes: Commands that you send from your computer to set up modes, govern paper movement and perform a variety of other chores.

Draft print: A mode employed to produce quick printouts. It uses a character set consisting of a minimal number of dots.

Epson mode: See software emulation, below.

Font: A typeface, or style of characters.

Interface: A device with a cable or wires at each end that connects a printer to

Printer Comparison Chart

Manufacturer	Model	Software Emulation	Bit Image Density (Low-High dpi)	Print Pitches (Prop = Proportional)	NLQ or LQ Matrix @10 cpi
Seikosha	SK-3000	Epson LQ-1000 IBM Proprinter	60-240 60-240	10,12,15,17, Prop 10,12,15,17, Prop	24 × 18[5]
Panasonic	KX-P1092i	Epson FX-80 IBM Proprinter	60-240 60-240	10,12,15,17, Prop 10,12,15,17, Prop	18 × 18
	KX-P1524	Epson LQ-1500 IBM Proprinter Diablo 630	60-360[1] 60-240[2] 60-240[2]	10,12,15,17, Prop 12,17 10,12,15,17, Prop	24 × 30 (LQ)
Okidata	Microline 183	Okidata	60-144	10,12,17	18 × 18
	Microline 393	Epson LQ-1000	60-240[2] 60-360[3]	10,12,15,17,20, Prop	24 × 36 (LQ)
Brother	M-1724L	Epson LQ-1000 IBM Proprinter Diablo/Brother	60-360[1] 60-360[1] n/a	10,12,15,17, Prop 10,12,17, Prop 10,12,17, Prop	24 × 29 (LQ)
Epson	FX-850	Epson FX IBM Proprinter	60-240 60-240	10,12,17,20, Prop 10,12,17,20, Prop	18 × 18

(1) In both 8-pin and 24-pin modes.
(2) 8-pin mode only.
(3) 24-pin mode only.
(4) Manufacturer's claimed speed. Figures reflect high-speed mode, if available.
(5) The SK-3000 is a 9-pin printer; therefore, the 24 × 18 matrix includes half-dots.
(6) Expandable print buffers.

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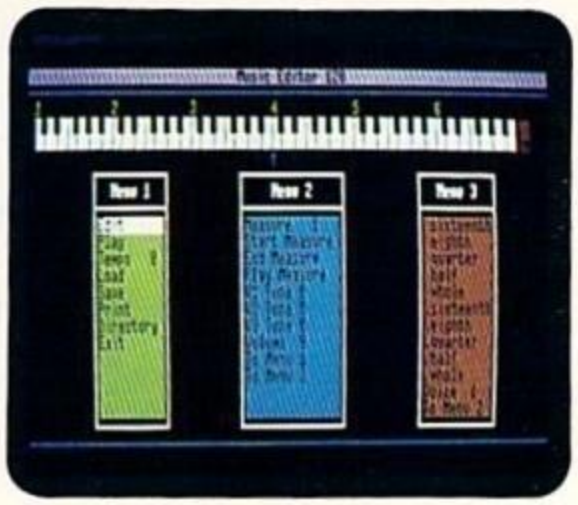
ment and add filtering effects with the Filter statement. Refer to any C-128 reference guide for a discussion of the computer's music commands to help you use Music Editor.

Keep in mind that Music Editor limits strings to 160 characters (two screen lines). You may have to divide a measure into two sections if your string is getting too long. R

Barbara Schulak is a self-taught computer programmer and freelance writer with interests in educational and home applications.



Dozens of options are at your fingertips to help you get rockin' 'round the clock!

Listing 1. Music Editor program.

```
10 SCNCLR:PRINTCHR$(14);CHR$(11
   );CHR$(27)"M";CHR$(2);
                              :REM*187
20 COLOR5,5:CHAR,32,5,"{SHFT M}
   USIC {SHFT E}DITOR 128":PRIN
   TCHR$(130);                :REM*238
30 TEMPO12:PLAY"V1T0V2T0V3T0U9V
   10O5IEI#DIEI#DIEO4IBO5IDICO4H
   AV2O2HA"                   :REM*90
40 COLOR5,2:CHAR,31,18,"{SHFT P
   }LEASE {SHFT S}TAND {SHFT B}
   Y..."                      :REM*42
50 A$="{CTRL 9}{COMD G}{CRSR RT
   } {CRSR RT} {COMD G}{CRSR RT
   } {CRSR RT} {CRSR RT} ":C$="
   {CTRL 9}{COMD G}{SHFT -} {SH
   FT -} {COMD G}{SHFT -} {SHFT
    -} {SHFT -} "             :REM*56
60 DIMM1$(8),M2$(9),M3$(12),N$(
   74),L$(12),O$(73),D$(10),A$(
   200):X=37:W=0:VO=1:TP=8:VL=9
   :CA=2:M=1:T(1)=0:T(2)=0:T(3)
   =0:VC=1:A$(1)=""           :REM*248
70 FORI=1TO12:READL$(I):NEXT
                              :REM*127
80 DATA C,#C,D,#D,E,F,#F,G,#G,A
   ,#A,B                      :REM*16
90 CT=0:FORI=1TO6:FORJ=1TO12:CT
   =CT+1                      :REM*197
100 N$(CT)=L$(J):NEXT:NEXT
                              :REM*241
110 CT=0:FORI=1TO6:FORJ=1TO12:C
   T=CT+1:O$(CT)="O"+RIGHT$(ST
   R$(I),1):NEXT:NEXT         :REM*157
120 N$(73)="R":O$(73)=""
                              :REM*182
130 FORI=0TO9:READD$(I):NEXT
                              :REM*182
140 DATA S,I,Q,H,W,.S,.I,.Q,.H,
   .W                         :REM*140
150 FORI=0TO7:READM1$(I):NEXT
                              :REM*103
160 DATA "{SHFT E}DIT{6 SPACEs}
   "                          :REM*20
170 DATA "{SHFT P}LAY{6 SPACEs}
   "                          :REM*87
180 DATA "{SHFT T}EMPO{3 SPACEs
   }8 "                       :REM*132
190 DATA "{SHFT L}OAD{6 SPACEs}
   "                          :REM*204
200 DATA "{SHFT S}AVE{6 SPACEs}
   "                          :REM*35
210 DATA "{SHFT P}RINT{5 SPACEs
   }"                         :REM*202
220 DATA "{SHFT D}IRECTORY "
                              :REM*209
230 DATA "{SHFT E}XIT{6 SPACEs}
   "                          :REM*138
240 FORI=0TO9:READM2$(I):NEXT
                              :REM*151
250 DATA "{SHFT M}EASURE{3 SPAC
   Es}1{3 SPACEs}"            :REM*92
260 DATA "{SHFT S}TART {SHFT M}
   EASURE "                   :REM*236
270 DATA "{SHFT E}ND {SHFT M}EA
   SURE{3 SPACEs}"            :REM*187
280 DATA "{SHFT P}LAY {SHFT M}E
   ASURE{2 SPACEs}"           :REM*146
290 DATA "{SHFT V}1 {SHFT T}UNE
   0{5 SPACEs}"               :REM*105
300 DATA "{SHFT V}2 {SHFT T}UNE
   0{5 SPACEs}"               :REM*119
310 DATA "{SHFT V}3 {SHFT T}UNE
   0{5 SPACEs}"               :REM*69
320 DATA "{SHFT V}OLUME{2 SPACE
   s}9{5 SPACEs}"             :REM*74
330 DATA "{SHFT T}O {SHFT M}ENU
   1{5 SPACEs}"               :REM*196
340 DATA "{SHFT T}O {SHFT M}ENU
   3{5 SPACEs}"               :REM*37
350 FORI=0TO11:READM3$(I):NEXT
                              :REM*52
360 DATA " SIXTEENTH"         :REM*226
370 DATA " EIGHTH{3 SPACEs}"
                              :REM*173
380 DATA " QUARTER{2 SPACEs}"
                              :REM*57
390 DATA " HALF{5 SPACEs}"
                              :REM*174
400 DATA " WHOLE{4 SPACEs}"
                              :REM*153
410 DATA ".SIXTEENTH"         :REM*77
420 DATA ".EIGHTH{3 SPACEs}"
                              :REM*14
430 DATA ".QUARTER{2 SPACEs}"
                              :REM*157
440 DATA ".HALF{5 SPACEs}"
                              :REM*11
450 DATA ".WHOLE{4 SPACEs}"
                              :REM*245
460 DATA "{SHFT V}OICE{2 SPACEs
   }1{2 SPACEs}"              :REM*196
470 DATA "{SHFT T}O {SHFT M}ENU
   {SHFT SPACE}2 "            :REM*173
480 PRINT"{SHFT CLR}":COLOR5,5:
   CHAR,0,0,"{32 SPACEs}{SHFT
   M}USIC {SHFT E}DITOR 128{31
    SPACEs}",1                :REM*44
490 COLOR5,7:CHAR,0,1,"{79 SHFT
    *s}"                      :REM*242
500 COLOR5,6:CHAR,0,2," 1{11 SP
   ACEs}2{11 SPACEs}3{11 SPACE
   s}4{11 SPACEs}5{11 SPACEs}6
   "                          :REM*51
510 COLOR5,2:CHAR,1,3,"":FORI=1
   TO6:PRINTA$;:NEXT:PRINT"{CT
   RL 3}{2 SPACEs}";          :REM*7
520 CHAR,1,4,"":PRINT"{CTRL 9}{
   CTRL 2}";:FORI=1TO6:PRINTC$
   ;:NEXT:PRINT"{CTRL 3}RE"
                              :REM*252
530 COLOR5,7:CHAR,X,5,"{UP ARRO
   W}"                        :REM*201
540 COLOR5,2:CHAR,10,6,"{COMD A
   }{10 SHFT *s}{COMD S}{10 SP
   ACEs}{COMD A}{14 SHFT *s}{C
   OMD S}{10 SPACEs}{COMD A}{1
   0 SHFT *s}{COMD S}":REM*224
550 CHAR,10,7,"{SHFT -}{2 SPACE
   s}{SHFT M}ENU 1{2 SPACEs}{S
   HFT -}{10 SPACEs}{SHFT -}{4
    SPACEs}{SHFT M}ENU 2{4 SPA
   CEs}{SHFT -}{10 SPACEs}{SHF
   T -}{2 SPACEs}{SHFT M}ENU 3
   {2 SPACEs}{SHFT -}" :REM*78
560 CHAR,10,8,"{COMD Q}{10 SHFT
    *s}{COMD W}{10 SPACEs}{COM
   D Q}{14 SHFT *s}{COMD W}{10
    SPACEs}{COMD Q}{10 SHFT *s
   }{COMD W}"                 :REM*52
570 FORI=9TO20:CHAR,10,I,"{SHFT
    -}{10 SPACEs}{SHFT -}{10 S
   PACEs}{SHFT -}{14 SPACEs}{S
   HFT -}{10 SPACEs}{SHFT -}{1
   0 SPACEs}{SHFT -}":NEXT
                              :REM*242
580 CHAR,10,21,"{COMD Z}{10 SHF
   T *s}{COMD X}{10 SPACEs}{CO
   MD Z}{14 SHFT *s}{COMD X}{1
   0 SPACEs}{COMD Z}{10 SHFT *
   s}{COMD X}"                :REM*203
590 COLOR5,7:CHAR,0,22,"{80 SHF
   T *s}"                     :REM*175 ►
```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Songs in the Key of C-128

Entering music is an exercise in harmony with Music Editor.

By BARBARA SCHULAK

Better tune up your C-128! Music Editor 128 facilitates transcribing written music, whether your own or sheet music, into strings that can be used by the C-128 Play statement. It will also store the music as a sequential file on disk, so you can rework it later or use it in your own programs.

The Music Editor screen displays three menus and octaves 1–6 of the piano keyboard. The two bottom lines of the screen are reserved for input and program response.

To select options from the menus, use a joystick plugged into port 2. Move it up and down to highlight the choices; then press the fire-button to select the one you want.

Menu 1 lets you access the editor (which leads to menus 2 and 3), load or save a file, print the file either to the screen or your printer, view the directory and set the tempo for the music. After you press the fire-button, a prompt appears at the bottom of the screen. Enter the necessary information, and the operation will proceed. To abort the operation, press the return key. You can also play all or part of the music from menu 1 by entering the starting and ending measures you want to hear.

Keying In the Music

To facilitate entering data, Music Editor works one measure at a time. Menu 2 lets you choose a measure to edit, start and end the measure and play it. You can also select the volume for each measure and the tuning envelope for each voice. I'd suggest using the first measure to define your tuning envelopes, so they can easily be changed later. It's also possible to change the tuning envelopes and volume for sections of the music. When you are all ready to begin work, choose the Start Measure option, which takes you to menu 3.

Menu 3 is for entering notes. First use the joystick to highlight and select the Voice Number option. Then move the joystick up and down and press the fire-button to choose the voice number, 1–3. Notice that the number you've chosen appears at the bottom of the screen. This is where the string will be displayed as you enter it.

To enter a note, move the joystick up and down to choose the duration (whole, half, quarter note, and so forth), then right and left to slide the arrow up and down the keyboard. When the arrow is pointing to the note you want, press the fire-button. The note will be played and displayed at the bottom of the screen. The red R on the keyboard stands for a rest. Continue in this fashion until you've completed your measure.

Then return to menu 2 to play the measure. If it sounds fine, select End Measure to add it to your file. If not, you can begin again by selecting Start Measure, which erases the string, or return to menu 3 to edit the string. Place the arrow on the red E at the right end of the keyboard and press the fire-button to erase a letter from the end of the string. You may have to do this several times to erase the parts you want to delete. When your measure is finished, select End Measure from Menu 2.

You can choose any measure to edit by selecting the Measure # option. Be sure to save your file periodically as you work.

Program Music

When you have a piece finished and want to include it in a program, use the following code to load and play the file:

```
10 F$ = "FILENAME":DIMA$(200)
20 DOPEN#2,(F$),R
30 INPUT#2,N
40 FORI = 1TON:INPUT#2,A$(I):NEXT
50 DCLOSE#2
60 FORI = 1TON:PLAYA$(I):NEXT
70 END
```

You can add your own Tempo statement (the default is 8), change the tuning envelopes with the Envelope state- ►

RUN it right: **C-128, in 80-Column mode; joystick; printer optional**

ILLUSTRATED BY LAURA CORNELL

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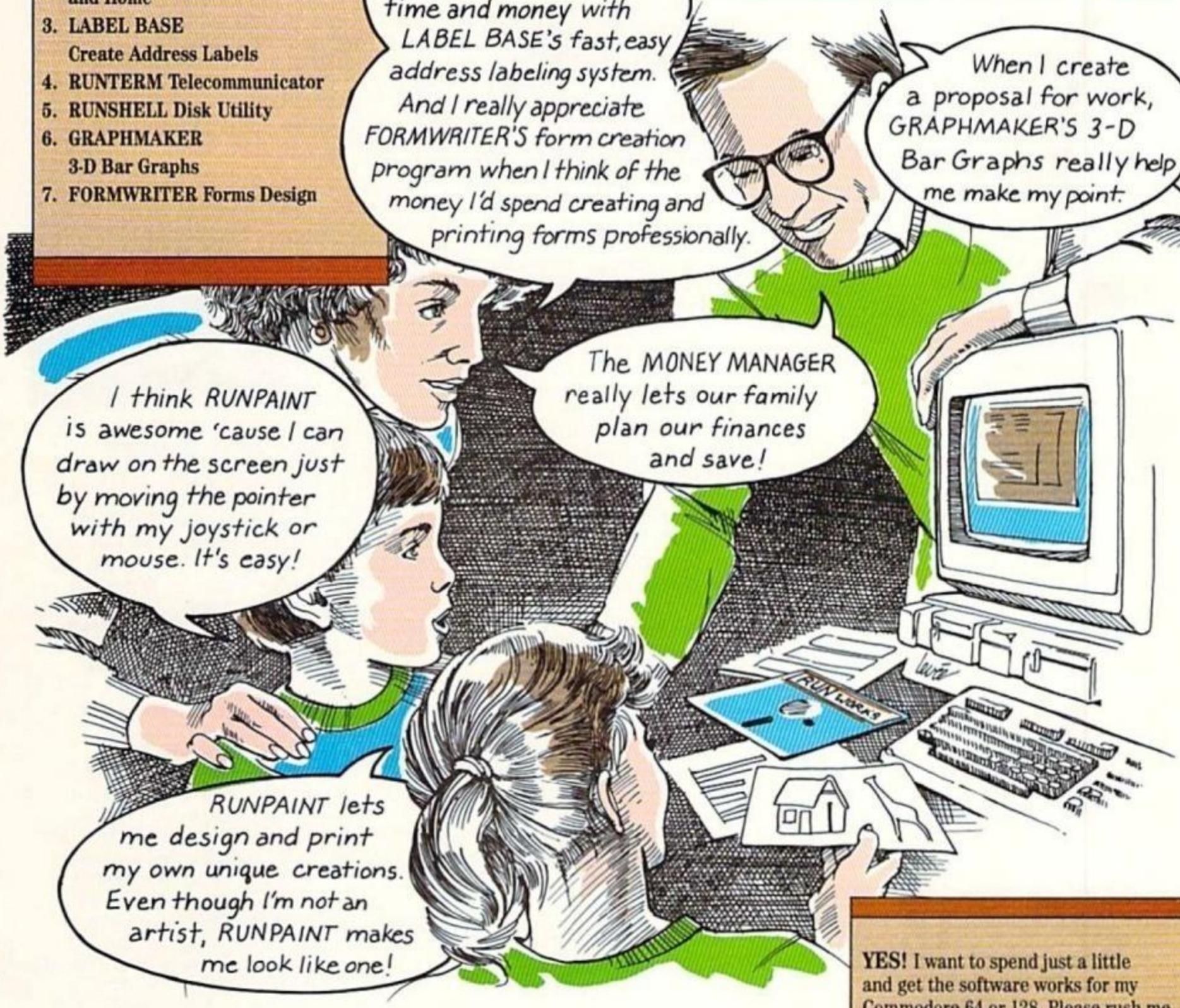
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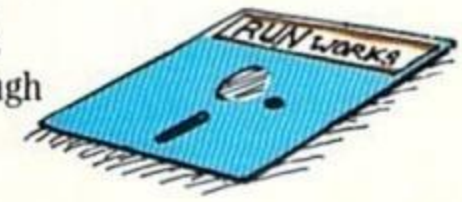

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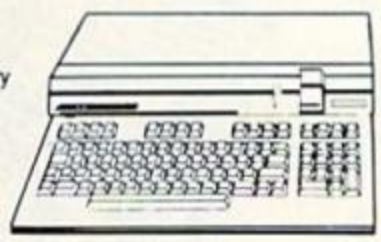

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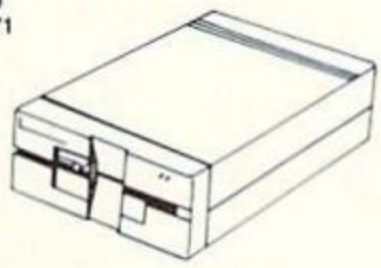

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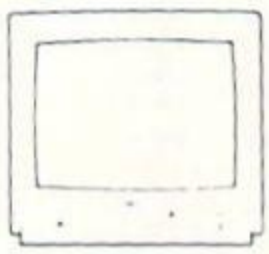

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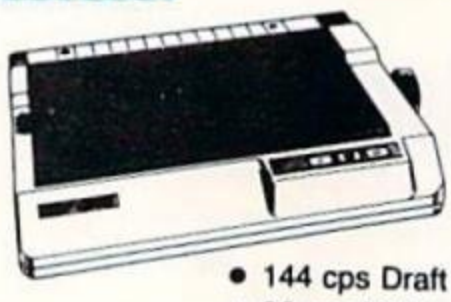

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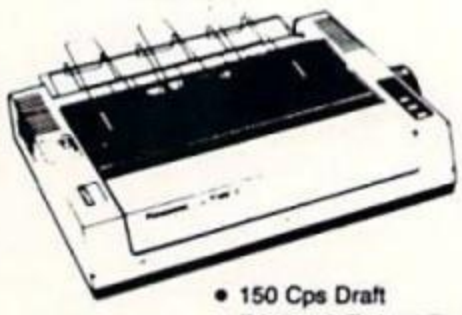

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1091i Model II	$189.95
1092i	$309.95
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a computer. An interface is necessary when connecting a Commodore, with its serial output, to a printer that expects parallel input.

Letter quality (LQ) and near letter quality (NLQ): Print modes featuring high-quality characters comprising tightly packed dots.

Matrix: The horizontal and vertical array of dots that composes a character produced by a dot matrix printer.

Parallel printer: This term most often refers to a printer with a 36-pin Centronics parallel port for interfacing with a computer. Most printers manufactured today are in this category.

Proportional print: Printing in which characters are spaced according to their width. For instance, in proportional-printed text an "I" would take less space than an "M."

Ribbon cartridge: A nylon or fabric printer ribbon enclosed in a plastic housing. This type of ribbon is used in most printers manufactured today.

Serial printer: Any printer equipped with a 25-pin RS-232 port for interfacing. Not to be confused with Commodore-compatible serial printers, which use a 6-pin cable.

Software emulation: Printers usually have one or more operating modes that respond to a standard set of instructions, such as those used by Epson printers; thus the term "Epson mode," which refers to a widely adopted standard. The process is called software emulation because the printer is responding to a set of standard software commands.

Super- and subscripts: Superscripts are half-height characters raised slightly above the text line, such as those denoting the power of a number or referring to a footnote. Subscripts are half-height characters printed below the text line, as in mathematical or scientific formulas or equations. ®

—TW

NLQ or LQ Print Speed[4]	Draft Mode Print Speed[4]	Italics Characters	Underlining	Super- and Subscripts	Buffer Capacity	Dimensions In Inches	Suggested Retail
75 cps @10 cpi 75 cps @12 cpi	300 cps @10 cpi 180 cps @12 cpi	Yes	Yes	Yes	10K	18.5 × 14.2 × 5.4	$ 649.00
48 cps @10 cpi	240 cps @10 cpi 240 cps @12 cpi	Yes	Yes	Yes	6K[6]	16.8 × 13.8 × 5.4	$ 529.95
80 cps @10 cpi	240 cps @10 cpi 172 cps @17 cpi	Yes	Yes	Yes	13.5K[7]	24 × 15.4 × 6.1	$ 949.00
n/a	120 cps @10 cpi	No	Yes	Yes	1K	20.7 × 11 × 3.2	$ 549.00
120 cps @12 cpi	450 cps @15 and 18 cpi	Yes	Yes	Yes	30K[8]	22.5 × 16.5 × 7.1	$1399.00
n/a	180 cps @10 cpi 192 cps @12 cpi	Yes	Yes	Yes	n/a	20.1 × 12 × 4.8	$ 949.00
45 cps @10 cpi 54 cps @12 cpi	220 cps @10 cpi 264 cps @12 cpi	Yes	Yes	Yes	8K	17.9 × 14.2 × 5.9	$ 549.00

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It's a fast-paced, action-packed adventure that's **more** than an arcade game. Stunning graphics, high quality animation and sound effects put you "in Toon" with Toontown's fate.

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SONGS IN THE KEY OF C-128

```
600 GOSUB2370:GOSUB2420:GOSUB24
    70                    :REM*190
610 :                     :REM*158
620 FORT=1TO50:NEXT       :REM*129
630 R=9:COLOR 5,2:CHAR,11,R,M1$
    (R-9),1               :REM*234
640 IFJOY(2)=5THENBEGIN:COLOR 5
    ,14:CHAR,11,R,M1$(R-9),1:R=
    R+1:IFR=17THENR=9     :REM*131
650 COLOR 5,2:CHAR,11,R,M1$(R-9
    ),1:BEND              :REM*205
660 IFJOY(2)=1THENBEGIN:COLOR 5
    ,14:CHAR,11,R,M1$(R-9),1:R=
    R-1:IFR<9THENR=16     :REM*243
670 COLOR 5,2:CHAR,11,R,M1$(R-9
    ),1:BEND              :REM*161
680 IFJOY(2)<>128THEN640
                          :REM*126
690 IFR=16THENPRINT"{2 HOMEs}{S
    HFT CLR}";CHR$(27)"L":END
                          :REM*173
700 IFR=9THENCOLOR 5,14:CHAR,11
    ,R,M1$(R-9),1:GOTO1440
                          :REM*203
710 IFR=14THENGOTO1220    :REM*220
720 IFR=15THEN1390        :REM*142
730 Z=R-9:ONZGOSUB760,880,970,1
    100                   :REM*171
740 GOTO640               :REM*48
750 :                     :REM*43
760 GOSUB2770:COLOR5,2:CHAR,0,2
    3,"{SHFT E}NTER STARTING ME
    ASURE: "              :REM*215
770 TY=2:L=2:GOSUB2510:IFCT=0TH
    EN860                 :REM*169
780 GOSUB2770:S1=VAL(V$)
                          :REM*126
790 CHAR,0,23,"{SHFT E}NTER END
    ING MEASURE: "        :REM*11
800 TY=2:L=2:GOSUB2510:IFCT=0TH
    EN860                 :REM*143
810 S2=VAL(V$):IFS2<S1THEN860
                          :REM*193
820 IFS2>NTHEN860           :REM*5
830 IFS1<1THEN860         :REM*132
840 TEMPO TP:GOSUB2770    :REM*240
850 FORI=S1TOS2:CHAR,0,23,"{SHF
    T M}EASURE:":PRINTI:PLAYA$(
    I):NEXT               :REM*139
860 GOSUB2770:RETURN      :REM*247
870 :                     :REM*163
880 GOSUB2770:COLOR5,2:CHAR,0,2
    3,"{SHFT E}NTER {SHFT T}EMP
    O [1-255]: "          :REM*176
890 L=3:TY=2:GOSUB2510:Q=VAL(V$
    ):IFCT=0THEN940       :REM*21
900 IFQ<1ORQ>255THENGOSUB2770:G
    OTO880                :REM*246
910 TP=VAL(V$):IFCT=1THENM1$(2)
    ="{SHFT T}EMPO{3 SPACEs}"+V
    $+" "                 :REM*82
920 IFCT=2THENM1$(2)="{SHFT T}E
    MPO{2 SPACEs}"+V$+" "
                          :REM*179
930 IFCT=3THENM1$(2)="{SHFT T}E
    MPO "+V$+" "          :REM*53
940 GOSUB2770               :REM*9
950 CHAR,11,R,M1$(R-9),1:RETURN
                          :REM*21
960 :                     :REM*249
970 GOSUB2770:COLOR5,2:CHAR,0,2
    3,"{SHFT E}NTER {SHFT F}ILE
    NAME: "               :REM*43
980 L=15:TY=4:GOSUB2510:IFCT=0T
    HEN940                :REM*13
990 F$=V$                 :REM*134
1000 DOPEN#2,(F$),R       :REM*167
1010 IFDS<>0THENGOSUB2730:GOTO1
    060                   :REM*195
1020 INPUT#2,N            :REM*166
1030 GOSUB2770            :REM*111
1040 CHAR,0,23,"":PRINT"{SHFT T
    }OTAL # {SHFT M}EASURES"N
                          :REM*229
1050 FORI=1TON:INPUT#2,A$(I):NE
    XT                    :REM*70
1060 DCLOSE#2             :REM*119
1070 GOSUB2770            :REM*151
1080 COLOR5,2:CHAR,11,R,M1$(R-9
    ),1:RETURN            :REM*59
1090 :                    :REM*120
1100 GOSUB2770:COLOR5,2:CHAR,0,
    23,"{SHFT E}NTER {SHFT F}I
    LENAME: "             :REM*168
1110 L=15:TY=4:GOSUB2510:IFCT=0
    THEN940               :REM*143
1120 F$=V$                 :REM*25
1130 SCRATCH (F$)         :REM*220
1140 DOPEN#2,(F$),W       :REM*107
1150 IFDS<>0THENGOSUB2730:GOTO1
    180                   :REM*130
1160 PRINT#2,N              :REM*71
1170 FORI=1TON:PRINT#2,A$(I):NE
    XT                    :REM*177
1180 DCLOSE#2             :REM*239
1190 GOSUB2770              :REM*0
1200 COLOR5,2:CHAR,11,R,M1$(R-9
    ),1:RETURN            :REM*179
1210 :                    :REM*240
1220 GOSUB2770:COLOR5,2:CHAR,0,
    23,"[{SHFT S}]CREEN OR [{S
    HFT P}]RINTER ?"      :REM*206
1230 GETKEYK$:IFK$=CHR$(13)THEN
    1370                  :REM*208
1240 IFK$="P"THEN1310     :REM*246
1250 IFK$<>"S"THEN1230    :REM*139
1260 PRINTCHR$(147);CHR$(27)"L"
    ;                     :REM*100
1270 FORI=1TON:PRINT"{SHFT M}EA
    SURE "I": ";A$(I):NEXT
                          :REM*13
1280 GOSUB2690            :REM*111
1290 PRINTCHR$(27)"M";:GOTO480
                          :REM*156
1300 :                    :REM*75
1310 GOSUB2770:CHAR,0,23,"{SHFT
     P}RINTER {SHFT R}EADY [Y/
    N]"                   :REM*248
1320 GETKEYK$:IFK$<>"Y"THEN1370
                          :REM*189
1330 OPEN4,4,7            :REM*186
1340 PRINT#4,"{SHFT F}ILE: "F$:
    PRINT#4               :REM*98
1350 FORI=1TON:PRINT#4,"{SHFT M
    }EASURE"I"- ";A$(I):NEXT
                          :REM*7
1360 PRINT#4:CLOSE4       :REM*136
1370 GOSUB2770:GOTO640    :REM*40
1380 :                    :REM*155
1390 PRINTCHR$(27)"L";CHR$(147)
    ;                     :REM*9
1400 DIRECTORY            :REM*96
1410 GOSUB2690            :REM*225
1420 PRINTCHR$(27)"M":GOTO480
                          :REM*140
1430 :                    :REM*213
1440 R=9:COLOR 5,2:CHAR,33,R,M2
    $(R-9),1              :REM*64
1450 FORT=1TO50:NEXT      :REM*196
1460 IFJOY(2)=5THENBEGIN:COLOR
    5,15:CHAR,33,R,M2$(R-9),1:
    R=R+1:IFR=19THENR=9
                          :REM*139
1470 COLOR 5,2:CHAR,33,R,M2$(R-
    9),1:BEND             :REM*117
1480 IFJOY(2)=1THENBEGIN:COLOR
    5,15:CHAR,33,R,M2$(R-9),1:
    R=R-1:IFR<9THENR=18
                          :REM*131
1490 COLOR 5,2:CHAR,33,R,M2$(R-
    9),1:BEND             :REM*65
1500 IFJOY(2)<>128THEN1460
                          :REM*92
1510 IFR=17THENCOLOR 5,15:CHAR,
    33,R,M2$(R-9),1:GOTO620
                          :REM*68
1520 IFR=10THENCOLOR 5,15:CHAR,
    33,R,M2$(R-9),1:A$(M)="":G
    OSUB2810:COLOR5,15:CHAR,33
    ,R,M2$(R-9),1:GOTO2080
                          :REM*219
1530 IFR=18THENCOLOR 5,15:CHAR,
    33,R,M2$(R-9),1:GOTO2080
                          :REM*116
1540 IFR=9THENGOSUB1580:GOTO145
    0                     :REM*196
1550 Z=R-9:ONZGOSUB1580,1710,20
    50,1770,1790,1810,1940
                          :REM*227
1560 GOTO1450             :REM*106
1570 :                      :REM*90
1580 FORT=1TO50:NEXT      :REM*69
1590 COLOR5,16:CHAR,33,R,M2$(0)
    ,1                    :REM*94
1600 IFJOY(2)=1THENM=M+1:IFM>N+
    1THENM=M-1            :REM*61
1610 IFJOY(2)=5THENM=M-1:IFM<1T
    HENM=1                :REM*14
1620 IFM<10THENM2$(0)="{SHFT M}
    EASURE{2 SPACEs}"+STR$(M)+
    "{3 SPACEs}":GOTO1650
                          :REM*119
1630 IFM<100THENM2$(0)="{SHFT M
    }EASURE "+STR$(M)+"{3 SPAC
    Es}":GOTO1650         :REM*230
1640 M2$(0)="{SHFT M}EASURE"+ST
    R$(M)+"{3 SPACEs}":REM*225
1650 COLOR5,16:CHAR,33,R,M2$(0)
    ,1                    :REM*154
1660 GOSUB2810            :REM*192
1670 IFJOY(2)<>128THEN1600
                          :REM*204
1680 COLOR5,2:CHAR,33,R,M2$(0),
    1                     :REM*236
1690 RETURN                 :REM*47
1700 :                    :REM*216
1710 A$(M)=A$(M)+"M":GOSUB2810
```


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SONGS IN THE KEY OF C-128

```
                              :REM*Ø
172Ø COLOR5,13:CHAR,33,R,M2$(2)
     ,1:FORI=1TO5Ø:NEXT :REM*79
173Ø COLOR5,2:CHAR,33,R,M2$(2),
     1                        :REM*7
174Ø IFM>NTHENN=M            :REM*142
175Ø RETURN                  :REM*99
176Ø :                       :REM*29
177Ø VO=1:GOSUB183Ø:RETURN
                             :REM*15
178Ø :                       :REM*41
179Ø VO=2:GOSUB183Ø:RETURN
                             :REM*55
18ØØ :                       :REM*69
181Ø VO=3:GOSUB183Ø:RETURN
                             :REM*95
182Ø :                       :REM*81
183Ø FORT=1TO5Ø:NEXT         :REM*9Ø
184Ø COLOR5,16:CHAR,33,R,M2$(R-
     9),1                    :REM*184
185Ø IFJOY(2)=1THENT(VO)=T(VO)+
     1:IFT(VO)>9THENT(VO)=Ø
                             :REM*44
186Ø IFJOY(2)=5THENT(VO)=T(VO)-
     1:IFT(VO)<ØTHENT(VO)=9
                             :REM*232
187Ø M2$(R-9)="{SHFT V}"+RIGHT$
     (STR$(VO),1)+" {SHFT T}UNE
     "+STR$(T(VO))+"{5 SPACEs}"
                             :REM*198
188Ø COLOR5,16:CHAR,33,R,M2$(R-
     9),1                    :REM*83
189Ø IFJOY(2)<>128THEN185Ø
                             :REM*14
19ØØ COLOR5,2:CHAR,33,R,M2$(R-9
     ),1                     :REM*2
191Ø A$(M)=A$(M)+"V"+RIGHT$(STR
     $(VO),1)+"T"+RIGHT$(STR$(T
     (VO)),1):GOSUB281Ø      :REM*3
192Ø RETURN                  :REM*6
193Ø :                       :REM*195
194Ø FORT=1TO5Ø:NEXT         :REM*172
195Ø COLOR5,16:CHAR,33,R,M2$(7)
     ,1                      :REM*118
196Ø IFJOY(2)=1THENVL=VL+1:IFVL
     >9THENVL=Ø              :REM*88
197Ø IFJOY(2)=5THENVL=VL-1:IFVL
     <ØTHENVL=9              :REM*192
198Ø M2$(7)="{SHFT V}OLUME "+ST
     R$(VL)+"{5 SPACEs}":REM*83
199Ø COLOR5,16:CHAR,33,R,M2$(7)
     ,1                      :REM*78
2ØØØ IFJOY(2)<>128THEN196Ø
                             :REM*135
2Ø1Ø COLOR5,2:CHAR,33,R,M2$(7),
     1                       :REM*149
2Ø2Ø A$(M)=A$(M)+"U"+RIGHT$(STR
     $(VL),1):GOSUB281Ø      :REM*92
2Ø3Ø RETURN                  :REM*116
2Ø4Ø :                       :REM*58
2Ø5Ø TEMPO TP                :REM*77
2Ø6Ø PLAYA$(M):RETURN        :REM*252
2Ø7Ø :                       :REM*88
2Ø8Ø R=9:COLOR 5,2:CHAR,59,R,M3
     $(R-9),1                :REM*125
2Ø9Ø FORT=1TO5Ø:NEXT         :REM*73
21ØØ IFJOY(2)=5THENBEGIN:COLOR
     5,11:CHAR,59,R,M3$(R-9),1:
     R=R+1:IFR=21THENR=9
                             :REM*2Ø4
211Ø COLOR 5,2:CHAR,59,R,M3$(R-
     9),1:BEND               :REM*143
212Ø IFJOY(2)=1THENBEGIN:COLOR
     5,11:CHAR,59,R,M3$(R-9),1:
     R=R-1:IFR<9THENR=2Ø:REM*45
213Ø COLOR 5,2:CHAR,59,R,M3$(R-
     9),1:BEND               :REM*147
214Ø IFJOY(2)=3THENBEGIN:COLOR5
     ,7:CHAR,X,5," ":X=X+1:IFX=
     75THENX=1               :REM*146
215Ø CHAR,X,5,"{UP ARROW}":BEND
                             :REM*241
216Ø IFJOY(2)=7THENBEGIN:COLOR5
     ,7:CHAR,X,5," ":X=X-1:IFX=
     ØTHENX=74               :REM*162
217Ø CHAR,X,5,"{UP ARROW}":BEND
                             :REM*197
218Ø IFJOY(2)<>128THEN21ØØ
                             :REM*131
219Ø IFR=2ØTHENCOLOR 5,11:CHAR,
     59,R,M3$(R-9),1:GOTO144Ø
                             :REM*6Ø
22ØØ IFR=19THEN226Ø:GOTO21ØØ
                             :REM*98
221Ø IFX=74THENL2=LEN(A$(M)):IF
     L2<=ØTHEN224Ø           :REM*122
2215 IFX=74THENA$(M)=LEFT$(A$(M
     ),L2-1):GOTO224Ø        :REM*147
222Ø Q$=O$(X)+D$(R-9)+N$(X)
                             :REM*23Ø
2225 IFLEN(A$(M))+LEN(Q$)>16ØTH
     EN224Ø                  :REM*2
223Ø A$(M)=A$(M)+Q$:PLAYQ$
                             :REM*175
224Ø GOSUB281Ø:GOTO2Ø9Ø:REM*17Ø
225Ø :                       :REM*13
226Ø FORT=1TO5Ø:NEXT         :REM*227
227Ø COLOR5,16:CHAR,59,R,M3$(1Ø
     ),1                     :REM*172
228Ø IFJOY(2)=1THENVC=VC+1:IFVC
     >3THENVC=1              :REM*2Ø5
229Ø IFJOY(2)=5THENVC=VC-1:IFVC
     <1THENVC=3              :REM*43
23ØØ M3$(1Ø)="{SHFT V}OICE "+ST
     R$(VC)+"{2 SPACEs}":REM*73
231Ø COLOR5,16:CHAR,59,R,M3$(1Ø
     ),1                     :REM*132
232Ø IFJOY(2)<>128THEN228Ø
                             :REM*149
233Ø COLOR5,2:CHAR,59,R,M3$(1Ø)
     ,1                      :REM*142
234Ø A$(M)=A$(M)+"V"+RIGHT$(STR
     $(VC),1)                :REM*162
235Ø GOSUB281Ø:GOTO2Ø9Ø      :REM*57
236Ø :                       :REM*123
237Ø WINDOW11,9,2Ø,2Ø,1:REM*1ØØ
238Ø FORI=ØTO7:PRINT"{CTRL 9}{C
     OMD 6}";M1$(I):NEXT:REM*53
239Ø FORI=1TO4:PRINT"{CTRL 9}{C
     OMD 6}{1Ø SPACEs}":NEXT
                             :REM*49
24ØØ RETURN                  :REM*231
241Ø :                       :REM*173
242Ø WINDOW33,9,46,2Ø,1:REM*226
243Ø FORI=ØTO9:PRINT"{CTRL 9}{C
     OMD 7}";M2$(I):NEXT
                             :REM*157
244Ø FORI=1TO2:PRINT"{CTRL 9}{C
     OMD 7}{14 SPACEs}":NEXT
                             :REM*185
245Ø RETURN                  :REM*42
246Ø :                       :REM*223
247Ø WINDOW59,9,68,2Ø,1:REM*111
248Ø FORI=ØTO11:PRINT"{CTRL 9}{
     COMD 3}";M3$(I):NEXT
                             :REM*75
249Ø PRINT"{2 HOMEs}":RETURN
                             :REM*21
25ØØ :                       :REM*247
251Ø V$="":K$="":CT=Ø:SYS52684,
     135,1Ø                  :REM*171
252Ø GETKEYK$                :REM*2Ø9
253Ø IFK$=CHR$(13)THEN266Ø
                             :REM*219
254Ø IFK$=CHR$(2Ø)ANDCT<>ØTHENP
     RINTCHR$(2Ø);:CT=CT-1:V$=L
     EFT$(V$,CT):GOTO252Ø
                             :REM*189
255Ø IFK$=" "THEN263Ø        :REM*52
256Ø IFK$="."THEN263Ø        :REM*15Ø
257Ø IFTY=1OR TY>2THENIF(K$>"@"
     )AND(K$<"[")THEN263Ø
                             :REM*19Ø
258Ø IFTY>1THENIF(K$>"/")AND(K$
     <":")THEN263Ø           :REM*18Ø
259Ø IFTY=1ORTY>2ANDCA=2THENIF(
     K$>"{SHFT *}")AND(K$<"{SHF
     T +}")THEN263Ø          :REM*238
26ØØ IFTY=4THENIF(K$>" ")AND(K$
     <"Ø")THEN263Ø           :REM*58
261Ø IFTY=4THENIF(K$>"9")AND(K$
     <"@")THEN263Ø           :REM*238
262Ø GOTO252Ø                :REM*141
263Ø IFCT>=LTHEN252Ø         :REM*123
264Ø CT=CT+1:V$=V$+K$:PRINTK$;
                             :REM*141
265Ø GOTO252Ø                :REM*147
266Ø IFCT=ØTHENV$=CHR$(Ø)
                             :REM*137
267Ø SYS52684,32,1Ø:RETURN
                             :REM*175
268Ø :                       :REM*184
269Ø CHAR,Ø,24,"{SHFT P}RESS {S
     HFT F}{SHFT I}{SHFT R}{SHF
     T E} TO CONTINUE.":REM*134
27ØØ IFJOY(2)<>128THEN27ØØ
                             :REM*42
271Ø RETURN                  :REM*47
272Ø :                       :REM*2Ø8
273Ø GOSUB277Ø               :REM*2
274Ø COLOR5,2:CHAR,Ø,24,"{SHFT
     D}ISK {SHFT S}TATUS: ":PRI
     NTDS$                   :REM*146
275Ø SLEEP2:RETURN           :REM*6
276Ø :                       :REM*9
277Ø CHAR,Ø,23,"":PRINTCHR$(27)
     "Q"                     :REM*36
278Ø CHAR,Ø,24,"":PRINTCHR$(27)
     "Q"                     :REM*2Ø
279Ø RETURN                  :REM*127
28ØØ :                       :REM*33
281Ø COLOR5,2:CHAR,Ø,23,A$(M):P
     RINTCHR$(27)"Q"         :REM*98
282Ø RETURN                  :REM*153
1ØØØØ SCRATCH"MUSIC EDITOR 128"
      :DSAVE"MUSIC EDITOR 128"
                             :REM*177 ■
```


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Instant Test-Maker

If you're a teacher who's tired of making up tests, this Question Box program has the answer for you.

By HUGH McMENAMIN

Of all the chores teachers have to face, the most time-consuming seems to be preparing and grading examinations. The Question Box program eliminates some of this drudgery by letting you construct a library of examination questions and then retrieve individual questions to assemble into tests.

Question Box, which works on both the C-64 and the C-128 in 40-Column mode, handles all the common forms of questions: multiple-choice, true-false, fill-in-the-blank and essay. Individual questions can be previewed from the Master file and selected either by you or, randomly, by the computer. The new Test file can then be printed out or stored to disk. As a bonus, you can include superscripts and subscripts in your questions.

Here are instructions for using The Question Box's numerous commands.

All steps in test-making start here at the main menu.

Entering Questions

E (Enter) calls up the menu for selecting the type of question. The body of a question may consist of four lines of up to 60 characters each, with a → marker in reverse field indicating the 60-character limit. If you exceed the limit, the program will truncate the line automatically.

To enter each line, press the return key. Also press return to enter null (empty) lines when no further text is desired. If you want additional space between the body of a multiple-choice, true-false or essay question and the answer, enter a shift/space.

Note that commas and colons *may* be used in your entries, but quotation marks may not.

T (True-false) questions are automatically followed with the two responses to be circled: True False

F (Fill-blank) requires you to construct the blank, (_____), within the question by using the Commodore and @ keys simultaneously.

E (Essay) mode provides for up to nine empty lines after the main body of the question.

M (Multiple-choice) questions allow you to add four answers after the letters A–D, again within the 60-character limit per line.

Each time you finish entering a question, you'll be asked if you want to add another. If your response is other than Y, the command screen will return.

R (Review File) lists the number of each question in the Master file and 26 characters of the question's first line. The question type is also shown, in reverse field, for easy identification in using the Correct, Delete and Transfer modes.

C (Correct) asks for the number of the question to be corrected, then displays the question, along with code numbers 0–7 for multiple-choice and 0–3 for the others. Null lines are indicated by a period after the number (5 .), while shift/space lines are indicated by a blank after the number (5). The line you select by entering a code number is displayed below a dashed line. Make your corrections, including commas and colons, then reenter the line by pressing return.

Making Up Tests

T (Transfer) mode lets you select individual questions to be transferred from the Master file to the Test file. If you don't enter N at the prompt, the selected question will be appended to the Test file.

N (New Test) moves a random selection of questions from the Master file to the Test file. Both Transfer and New Test limit Test file questions to 50. If New Test doesn't reach the 50-question limit, you can add other questions to the Test file individually.

P (Print) allows printing from either the Master or Test file to the screen, disk or printer. When printing to the screen, the display will scroll about 20 lines. When printing to the printer, only complete questions will appear on a page; they won't wrap to the next page. Print-to-disk stores the data as ASCII characters, which then can be loaded into a word processor, such as RUN Script, for further revision. If you're using RUN Script, you can enter formatting codes with the Define Macros program (see *RUN*, January 1987). The print-to-disk files are identified by a hyphen (-) preceding the filename.

D (Delete) asks for the number of a question to be removed from the Master file. Since the remaining questions are renumbered, check first with Review for the correct numbers of any additional questions to be deleted. Once a question has been deleted, it cannot be recalled.

Disk Operations

Press 4 or $ (shifted 4) to view a directory of all the Question Box files on ►

RUN it right: **C-64; C-128 in 40-Column mode; printer**

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a disk. These files are identified by a + before the name.

L (Load) displays a $ prompt to ask for the name of the file. Press return to view a list of the Question Box files on the disk, then select the one you want by moving the cursor to the name and pressing return. Or, you can type in the filename—without the + prefix.

You'll also be asked if the file should be added to the Master file. With this mechanism, you can append small files to each other to build larger files. Just don't try to make the Master file too big; The Question Box limits it to 100 questions.

S (Save) asks if the Master file or the Test file is to be saved. When a Test file is saved, .t is appended to the filename as an identifier. You can load Test files directly from the disk to the Master file by entering the entire name, including the .t suffix.

Quitting and Help

Q (Quit) terminates the program. If you press Q accidentally, you can preserve any test data in memory by entering GOTO 190 and return.

H (Help) lists the Question Box commands and some of the program functions.

Superscripts and Subscripts

I designed The Question Box so that you can utilize embedded super- and subscript commands with printers that support them. You have two size options for these: conventional and full-size. Those of the conventional small size are set by line 160. The control code for the superscript is CHR$(27) + "S0", and for the subscript CHR$(27) + "S1". Both are cancelled by CHR$(27) + "T".

To activate superscript printing, press the up-arrow (↑) key. After the superscript is completed, press the left-arrow (←) key to return to normal printing. The subscript is activated by the British pound key (£), and again is cancelled by the left-arrow key. Following this pattern, the formula for water would be printed with H£2←O and the notation for ten squared with 10↑2←.

Because of the difficulty in copying the miniature characters with some printers, I've provided for full-size super- and subscripts. However, they work only with printers that allow you to reverse direction with the paper feed. Examples of these are the Epson FX-80 and emulators of the FX-80 series (the C.Itoh Prowriter Jr. and the Star NX-1000, in Tractor mode only).

Full-size is selected at the beginning of the printer option. The printer control codes are defined as the up string (up$) and down string (dn$) in line 140, and these strings are activated when you choose the full-size option.

To initiate full-size superscripts, you press the ↑ key, and you cancel them with the £ key. Subscripts are activated and cancelled with the reverse procedure: £ to activate, and ↑ to cancel. With the full-size characters, then, you'd print ten squared with 10↑2£ and the formula for water with H£2↑O.

Operating Notes

The Question Box is heavily dependent on string manipulation, which slows operation on the C-64 because of that machine's memory limitations. You can speed things up by placing a REM at the beginning of line 240 to negate the Fre(1) command, which performs the nonessential functions of calculating free space left and packing strings.

If your computer seems to stop while you're running The Question Box, it's probably the result of garbage collection and not a complete lock-up. When this happens, wait for a minute or two to see if the program continues. If not, press run-stop/restore and enter GOTO 190 to preserve your questions.

If you possess Abacus's Basic 64, I'd highly recommend using it to compile The Question Box. Then it will work very well in C-64 mode, even with line 240 fully operational.

If your printer won't work with The Question Box, you may have to change the control codes in lines 140–170 to accommodate your interface. See your printer manual for these codes.

Last but not least, be sure to save your questions to disk frequently. Then you won't have any test surprises! R

Hugh McMenamin is a physician and amateur programmer who wrote this program to help his daughter, a chemistry teacher.

Listing 1. Question Box program.

```
10 REM THE QUESTION BOX V.3
                          :REM*222
20 REM BY HUGH MCMENAMIN
                          :REM*140
30 GOSUB3840              :REM*122
40 DIM CA$(101,7),CB$(50,7),P(1
   00),PP$(4),PZ$(4):EF=FRE(1)
                          :REM*238
50 FORI=1TO4:READPP$(I):NEXT
                            :REM*7
60 FORI=1TO4:READPZ$(I):NEXT
                          :REM*181
70 GOSUB3790:GOTO180      :REM*35
80 PRINT"{SHFT CLR}"TAB(124)"SE
   LECT SIZE OF SUPER-SUBSCRIPT
                          :REM*70
90 PRINT"{2 CRSR DNs} {CTRL 9}R
   {CTRL 0}EGULAR SIZE (MOST PR
   INTERS)                :REM*14
100 PRINT"{3 CRSR DNs} {CTRL 9}
    F{CTRL 0}ULL SIZE (PRINTERS
     WITH REVERSE FEED)":REM*67
110 PRINT"{CRSR DN} EPSON FX-80
     PROWRITER JR. OR COMPATABL
    E                     :REM*195
120 GOSUB3800             :REM*192
130 IFA$<>"F"THEN160      :REM*69
140 UP$=CHR$(27)+"J"+CHR$(10):D
    N$=CHR$(27)+"{SHFT J}"+CHR$
    (10):ST$="":REM* BIG SUPSCR
                          :REM*69
150 GOTO170               :REM*228
160 UP$=CHR$(27)+"{SHFT S}0":DN
    $=CHR$(27)+"{SHFT S}1":ST$=
    CHR$(27)+"{SHFT T}":REM * R
    EG SUPER-SUBSCR       :REM*43
170 PF$=CHR$(12):RETURN:REM * P
    AGE FEED              :REM*184
180 BQ$="{16 COMD @s}{CRSR DN}{
    16 CRSR LFs}{CTRL 9}{SHFT T
    }{SHFT H}{SHFT E} {SHFT Q}{
    SHFT U}{SHFT E}{SHFT S}{SHF
    T T}{SHFT I}{SHFT O}{SHFT N
    } {SHFT B}{SHFT O}{SHFT X}{
    CTRL 0}"              :REM*146
190 PRINT"{SHFT CLR}{CTRL 2}"CH
    R$(14)TAB(51)BQ$      :REM*124
200 PRINTTAB(125)"{CTRL 9}E{CTR
    L 0}NTER{4 SPACEs}{CTRL 9}C
    {CTRL 0}ORRECT{4 SPACEs}{CT
    RL 9}P{CTRL 0}RINT    :REM*31
210 PRINTTAB(45)"{CTRL 9}T{CTRL
     0}RANSFER {CTRL 9}D{CTRL 0
    }ELETE{5 SPACEs}{CTRL 9}R{C
    TRL 0}EVIEW FILE      :REM*235
220 PRINTTAB(45)"{CTRL 9}H{CTRL
     0}ELP{5 SPACEs}{CTRL 9}N{C
    TRL 0}EW TEST{3 SPACEs}{CTR
    L 9}${CTRL 0} DIRECTORY
                          :REM*48
230 PRINTTAB(45)"{CTRL 9}L{CTRL
     0}OAD{5 SPACEs}{CTRL 9}S{C
    TRL 0}AVE{7 SPACEs}{CTRL 9}
    Q{CTRL 0}UIT{CRSR DN}"
                          :REM*243
240 FX=FRE(1):FY=EF/100:FA%=FX/
    FY                    :REM*184
250 PRINTTAB(10)FA%"% SPACE AVA
    ILABLE"               :REM*89
260 PRINTTAB(45)"ENTER THE LETT
    ER FOR SELECTION      :REM*135
270 GETB$:IFB$<>""THEN270
                          :REM*182
280 GETB$:IFB$=""THEN280
                          :REM*252 ►
```


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TEST-MAKER

```
29Ø FORI=1TO13:IFB$=MID$("ECRDP
    LSQTH$4N",I,1)THENB=I
                        :REM*221
3ØØ NEXT                :REM*175
31Ø ONBGOSUB73Ø,354Ø,37Ø,6ØØ,11
    6Ø,221Ø,2Ø3Ø,34Ø,289Ø,272Ø,
    49Ø,49Ø,322Ø        :REM*212
32Ø B$="":B=Ø:GOTO18Ø   :REM*12Ø
33Ø REM QUIT            :REM*68
34Ø PRINT"{SHFT CLR}"TAB(247)BQ
    $;                  :REM*56
35Ø PRINT" IS CLOSED!"TAB(24Ø):
    END                 :REM*163
36Ø REM REVIEW          :REM*36
37Ø PRINT"{SHFT CLR}{CRSR DN}{2
     SPACEs}THESE ARE YOUR QUES
    TIONS:{CRSR DN}"    :REM*14Ø
38Ø IFCA$(1,Ø)=""THENGOTO32ØØ
                        :REM*171
39Ø PRINTTAB(19)"QUESTION {CTRL
     9} TYPE {CRSR DN}" :REM*2Ø
4ØØ FORX=1TOQN          :REM*219
41Ø PRINTX;LEFT$(CA$(X,Ø),26):P
    RINTTAB(28);"{CRSR UP}{CTRL
     9}";               :REM*117
42Ø FORI=1TO4:IFRIGHT$(CA$(X,Ø)
    ,1)=MID$("EFMT",I,1)THENP=I
                        :REM*1ØØ
43Ø NEXT                :REM*5Ø
44Ø PRINTPP$(P)         :REM*48
45Ø NEXT                :REM*7Ø
46Ø GOSUB379Ø           :REM*61
47Ø RETURN              :REM*1Ø2
48Ø REM DIRECTORY       :REM*54
49Ø PRINT"{SHFT CLR}"TAB(122)"D
    IRECTORY OF {CRSR UP}";BQ$;
    " FILES:{CRSR DN}" :REM*237
5ØØ OPEN1,8,Ø,"$Ø:*=S" :REM*2Ø5
51Ø FORJ=1TO32:GET#1,S$:NEXT
                        :REM*66
52Ø GET#1,S$,S$,L$,H$:IFSTTHENC
    LOSE1:GOTO58Ø       :REM*132
53Ø GET#1,S$:IFS$>""THENF$=F$+S
    $:GOTO53Ø           :REM*24
54Ø IFMID$(F$,4,2)=CHR$(34)+"+"
    THEN PRINTMID$(F$,4,18)
                        :REM*73
55Ø IFMID$(F$,3,2)=CHR$(34)+"+"
    THEN PRINTMID$(F$,3,18)
                        :REM*32
56Ø F$=""               :REM*Ø
57Ø GOTO52Ø             :REM*135
58Ø IFB$="L"THENRETURN  :REM*9
59Ø GOSUB379Ø:RETURN    :REM*242
6ØØ PRINT"{SHFT CLR}{CRSR DN}{5
     SPACEs}DELETE ROUTINE "
                        :REM*171
61Ø INPUT"{3 CRSR DNs}{2 SPACEs
    }DELETE WHICH QUESTION ";A$
                        :REM*19Ø
62Ø DQ=VAL(A$)          :REM*3
63Ø IFCA$(DQ,Ø)=""THENRETURN
                        :REM*173
64Ø FORX=DQTOQN         :REM*251
65Ø IFRIGHT$(CA$(X+1,Ø),1)="M"T
    HENW=7:GOTO67Ø      :REM*49
66Ø W=4                 :REM*239
67Ø FORI=ØTOW           :REM*2Ø6
68Ø CA$(X,I)=CA$(X+1,I):REM*228
69Ø NEXT:NEXT           :REM*43
7ØØ QN=QN-1             :REM*239
71Ø RETURN              :REM*87
72Ø REM ENTER QUESTION  :REM*98
73Ø QN=QN+1             :REM*247
74Ø IFQN>1ØØTHENGOSUB383Ø:QN=QN
    -1:RETURN           :REM*166
75Ø PRINT"{SHFT CLR}"TAB(88)"EN
    TER QUESTION TYPE:  :REM*62
76Ø PRINTTAB(82)"{CTRL 9}M{CTRL
     Ø}ULTIPLE CHOICE{6 SPACEs}
    {CTRL 9}T{CTRL Ø}RUE-FALSE
                        :REM*41
77Ø PRINT"{CRSR DN}{2 SPACEs}{C
    TRL 9}F{CTRL Ø}ILL IN BLANK
    S{7 SPACEs}{CTRL 9}E{CTRL Ø
    }SSAY               :REM*1ØØ
78Ø GETP$:IFP$=""THEN78Ø
                        :REM*161
79Ø IFP$<>"M"ANDP$<>"T"ANDP$<>"
    F"ANDP$<>"E"THEN78Ø:REM*186
8ØØ IFP$="F"ORP$="T"ORP$="M"THE
    NL$="Ø"             :REM*1Ø
81Ø IFP$="E"THENINPUT"{CRSR DN}
     HOW MANY LINES FOR THE ANS
    WER{3 SPACEs}4 {4 CRSR LFs}
    ";L$                :REM*5
82Ø IF(P$="E"ANDVAL(L$)>9)OR(P$
    ="E"ANDVAL(L$)<1)THENPRINT"
    {2 CRSR UPs}";:GOTO81Ø
                        :REM*9Ø
83Ø GOSUB251Ø:PRINT:REM PRINT H
    EADER               :REM*238
84Ø FORI=ØTO3           :REM*156
85Ø GOSUB264Ø:REM GET I$
                        :REM*178
86Ø CA$(QN,I)=I$+L$+P$  :REM*146
87Ø NEXT                :REM*235
88Ø IFP$="F"ORP$="T"ORP$="E"THE
    N94Ø                :REM*124
89Ø PRINT"ENTER POSSIBLE ANSWER
    S"                  :REM*147
9ØØ FORSN=4TO7          :REM*18Ø
91Ø GOSUB262Ø           :REM*223
92Ø CA$(QN,SN)=I$+L$+P$ :REM*51
93Ø NEXT                :REM*32
94Ø PRINT"{CRSR DN}{2 SPACEs}AN
    OTHER QUESTION?"    :REM*133
95Ø GOSUB381Ø           :REM*2
96Ø IFA$<>"Y"THENSN=Ø:RETURN
                        :REM*176
97Ø SN=Ø:GOTO73Ø        :REM*16Ø
98Ø REM WHICH FILE?     :REM*71
99Ø PRINT"{2 CRSR DNs}{7 SPACEs
    }WHICH FILE?{3 SPACEs}{SHFT
     SPACE}"            :REM*243
1ØØØ PRINT"{CRSR DN}{2 SPACEs}{
    CTRL 9}M{CTRL Ø}ASTER OR {
    CTRL 9}T{CTRL Ø}EST FILE?"
                        :REM*249
1Ø1Ø GETAN$:IFAN$=""THEN1Ø1Ø
                        :REM*135
1Ø2Ø IFAN$<>"M"ANDAN$<>"T"THEN1
    Ø1Ø                 :REM*225
1Ø3Ø IFAN$="M"THENFL=1  :REM*15Ø
1Ø4Ø IFAN$="T"THENFL=Ø  :REM*196
1Ø5Ø RETURN             :REM*172
1Ø6Ø REM FLAG MASTER/TEST
                        :REM*18
1Ø7Ø IFFL=1THENPR$=CA$(X,I)
                        :REM*1Ø4
1Ø8Ø IFFL=ØTHENPR$=CB$(X,I)
                        :REM*89
1Ø9Ø IFPR$=""THEN111Ø   :REM*68
11ØØ R=VAL(MID$(PR$,LEN(PR$)-1,
    1)):PT$=RIGHT$(PR$,1):PR$=
    LEFT$(PR$,LEN(PR$)-2)
                        :REM*1Ø5
111Ø RETURN             :REM*224
112Ø TI$="ØØØØØØ"       :REM*88
113Ø IFTI>15ØTHENRETURN:REM*227
114Ø GOTO113Ø           :REM*169
115Ø REM PRINT          :REM*78
116Ø PRINT"{SHFT CLR}"TAB(87)"P
    RINT ROUTINE"       :REM*27
117Ø GOSUB99Ø           :REM*25Ø
118Ø I=Ø                :REM*223
119Ø IFFL=1THENQX=QN    :REM*37
12ØØ IFFL=ØTHENQX=NQ    :REM*45
121Ø IFQX=ØTHENPRINT"{CRSR DN}{
    2 SPACEs}{CTRL 9} THE FILE
     IS EMPTY {CTRL Ø}":GOSUB1
    12Ø:RETURN          :REM*75
122Ø PRINT"{CRSR DN}{2 SPACEs}P
    RINT TO THE:{CRSR DN}"
                        :REM*71
123Ø PRINT"{2 SPACEs}{CTRL 9}S{
    CTRL Ø}CREEN, {CTRL 9}P{CT
    RL Ø}RINTER, OR {CTRL 9}D{
    CTRL Ø}ISK{CRSR DN}"
                        :REM*227
124Ø GETPO$:IF PO$=""THEN124Ø
                        :REM*95
125Ø IFPO$<>"S"ANDPO$<>"P"ANDPO
    $<>"D"THEN124Ø      :REM*78
126Ø IFPO$="S" OR PO$="{SHFT S}
    "THENOF$="":D=3:SA=Ø
                        :REM*28
127Ø IFPO$="D"ORPO$="{SHFT D}"T
    HEN129Ø             :REM*1Ø
128Ø GOTO135Ø           :REM*64
129Ø PRINT"{SHFT CLR}PRINT TO D
    ISK":INPUT"{2 SPACEs}FILEN
    AME ";OF$           :REM*163
13ØØ IF OF$="" THEN129Ø:REM*113
131Ø OF$="-"+LEFT$(OF$,15)
                        :REM*161
132Ø OF$="@Ø:"+OF$+",S,W"
                        :REM*164
133Ø INPUT"{2 SPACEs}DEVICE #(3
     SPACEs}8{3 CRSR LFs}";D:I
    FD<8 OR D>3ØTHEN133Ø
                        :REM*65
134Ø SA=3               :REM*251
135Ø IFPO$="P" OR PO$="{SHFT P}
    " THEN137Ø          :REM*2Ø4
136Ø GOTO144Ø           :REM*159
137Ø OF$="":D=4:GOSUB8Ø :REM*84
138Ø PRINT"{CRSR DN} ENTER THE
    NAME OF THE TEST.{CRSR DN}
                        :REM*191
139Ø GOSUB264Ø          :REM*2Ø1
14ØØ IF I$="."THENI$="":REM*19Ø
141Ø PH$=I$             :REM*2Ø8
142Ø PRINT"{SHFT CLR}"TAB(245)"
    PRINT TO PRINTER"   :REM*61
143Ø INPUT"{CRSR DN}{5 SPACEs}S
    ECONDARY ADDRESS{3 SPACEs}
```


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```
    7{3 CRSR LFs)";SA:IFSA<ØOR
    SA>255THEN142Ø     :REM*137
144Ø PRINT"{SHFT CLR}"TAB(2Ø6)"
    PRINTING...{2 CRSR DNs}
                       :REM*2Ø7
145Ø OPEN D,D,SA,OF$:LC=Ø:LA=1
                       :REM*74
146Ø FORX=1TOQX        :REM*8Ø
147Ø GOSUB1Ø7Ø          :REM*Ø
148Ø IFPR$=""THENPRINT" THE FIL
    E IS EMPTY!":GOSUB112Ø:CLO
    SED:RETURN         :REM*2Ø4
149Ø IFD=3ANDLC>2ØTHEN GOSUB379
    Ø:LC=Ø:PRINT"{SHFT CLR}{CR
    SR DN}";           :REM*6Ø
15ØØ IFD=4ANDLC>5ØTHENLC=Ø:PRIN
    T#4,PF$            :REM*212
151Ø IFD=4ANDLC=ØTHENGOSUB181Ø
                       :REM*113
152Ø IFD=4THENPRINT#4,TAB(1Ø);
                       :REM*1Ø
153Ø PRINT#D,STR$(X);". ";
                       :REM*1Ø7
154Ø IFD=4THEN GOSUB189Ø:LC=LC+
    1:GOTO156Ø         :REM*1Ø1
155Ø PRINT#D,PR$:LC=LC+1:REM*75
156Ø FORI=1TO3         :REM*1Ø1
157Ø GOSUB1Ø7Ø         :REM*1ØØ
158Ø IFPR$="."THEN162Ø  :REM*7Ø
159Ø IFD=4THENPRINT#D,SPC(LEN(S
    TR$(QX))+12);      :REM*54
16ØØ IFD=4THENGOSUB189Ø:LC=LC+1
    :GOTO162Ø          :REM*158
161Ø PRINT#D,SPC(4)PR$:LC=LC+1
                       :REM*1Ø
162Ø NEXT              :REM*2Ø8
163Ø IFPT$="F"THEN175Ø :REM*12Ø
164Ø IFPT$="T"THENPRINT#D:PRINT
    #D,SPC(22)"{SHFT T}RUE{4 S
    PACEs}{SHFT F}ALSE":LC=LC+
    2:GOTO175Ø         :REM*22Ø
165Ø IFD=4THENPRINT#D:LC=LC+1
                       :REM*2ØØ
166Ø IFPT$="E"THENFORZ=1TOR:PRI
    NT#D:LC=LC+1:NEXT:GOTO175Ø
                       :REM*2Ø8
167Ø FORI=4TO7         :REM*243
168Ø GOSUB1Ø7Ø         :REM*21Ø
169Ø IFPR$="."THEN174Ø :REM*247
17ØØ IFD=4THENPRINT#4,TAB(13);
                       :REM*223
171Ø PRINT#D,SPC(5)CHR$(189+I);
    ". ";              :REM*223
172Ø IFD=4THENGOSUB189Ø:LC=LC+1
    :GOTO174Ø          :REM*219
173Ø PRINT#D,PR$:LC=LC+1:REM*62
174Ø NEXT              :REM*73
175Ø PRINT#D:PRINT#D:LC=LC+2
                       :REM*85
176Ø I=Ø               :REM*2Ø
177Ø NEXTX             :REM*2Ø
178Ø IFD=4THENPRINT#D,PF$:REM*8
179Ø CLOSED:IFD=3ANDLC<>ØTHENGO
    SUB379Ø            :REM*172
18ØØ RETURN            :REM*145
181Ø PRINT#D           :REM*58
182Ø PRINT#D,SPC(7Ø)"{SHFT P}AG
    E ";LA:LA=LA+1     :REM*51
183Ø PRINT#D           :REM*78
184Ø PRINT#D,SPC(5Ø)"{SHFT N}AM
    E {19 COMD @s}":PRINT#D
                       :REM*125
185Ø PRINT#D,SPC((8Ø-LEN(PH$))/
    2)PH$              :REM*59
186Ø PRINT#D:PRINT#D:LC=LC+8
                       :REM*16
187Ø RETURN            :REM*219
188Ø REM * PRINT SUPER AND SUBS
    CRIPT *            :REM*127
189Ø FORR=1TOLEN(PR$)  :REM*2Ø8
19ØØ A$=MID$(PR$,R,1)   :REM*32
191Ø IFA$="{UP ARROW}"THENPRINT
    #D,UP$;:GOTO195Ø   :REM*218
192Ø IFA$="{LB.}"THENPRINT#D,DN
    $;:GOTO195Ø        :REM*237
193Ø IFA$="{LEFT ARROW}"THENPRI
    NT#D,ST$;:GOTO195Ø:REM*128
194Ø PRINT#D,A$;       :REM*94
195Ø NEXT              :REM*4Ø
196Ø PRINT#D           :REM*192
197Ø RETURN            :REM*72
198Ø REM GET PRINT STRING
                       :REM*135
199Ø IFFL=1THENPR$=CA$(X,I)
                       :REM*195
2ØØØ IFFL=ØTHENPR$=CB$(X,I)
                       :REM*61
2Ø1Ø RETURN            :REM*96
2Ø2Ø REM SAVE          :REM*129
2Ø3Ø IFCA$(1,Ø)=""ANDCB$(1,Ø)="
    "THENPRINT"{SHFT CLR}":GOS
    UB32ØØ:RETURN      :REM*27
2Ø4Ø INPUT"{SHFT CLR}{2 CRSR DN
    s}{2 SPACEs}NAME OF FILE";
    IN$                :REM*61
2Ø5Ø GOSUB99Ø          :REM*1Ø2
2Ø6Ø GOSUB384Ø         :REM*1Ø8
2Ø7Ø PRINT"{CRSR DN}{1Ø SPACEs}
    SAVING ";IN$       :REM*148
2Ø8Ø IFFL=1THENQX=QN:IN$=LEFT$(
    IN$,15)            :REM*72
2Ø9Ø IFFL=ØTHENQX=NQ:IN$=LEFT$(
    IN$,13)+".T"       :REM*2Ø7
21ØØ OPEN2,8,2,"@Ø:+"+IN$+",S,W
    "                  :REM*2Ø1
211Ø PRINT#2,QX        :REM*182
212Ø FORX=1TOQX        :REM*198
213Ø FORI=ØTO7         :REM*169
214Ø IFI>3ANDRIGHT$(PR$,1)<>"M"
    THEN217Ø           :REM*155
215Ø GOSUB199Ø         :REM*223
216Ø PRINT#2,CHR$(34);PR$
                       :REM*63
217Ø NEXT:NEXT         :REM*252
218Ø CLOSE2            :REM*129
219Ø RETURN             :REM*21
22ØØ REM LOAD           :REM*9
221Ø PRINT"{SHFT CLR}{2 CRSR DN
    s}{2 SPACEs}NAME OF FILE O
    R"                 :REM*85
222Ø INPUT"{CRSR DN}{2 SPACEs}$
     FOR DIRECTORY{4 SPACEs}${
    3 CRSR LFs}";IN$   :REM*231
223Ø IFIN$="$"THENPRINT"{SHFT C
    LR}{2 CRSR DNs} CURSOR TO
    FILE AND HIT <RETURN>{CRSR
     DN}":GOSUB5ØØ:INPUTIN$
                       :REM*54
224Ø IFLEFT$(IN$,1)<>"+"THENIN$
    ="+"+IN$           :REM*119
225Ø OPEN15,8,15,"IO":OPEN2,8,2
    ,IN$+",S,R"        :REM*141
226Ø INPUT#15,EN,EM$,ET,ES
                       :REM*156
227Ø IFEN<>ØTHENGOTO245Ø:
                       :REM*124
228Ø INPUT#2,QT         :REM*49
229Ø PRINT"{SHFT CLR}{4 CRSR DN
    s}DO YOU WANT TO ADD TO TH
    E PRESENT FILE?    :REM*252
23ØØ GOSUB381Ø          :REM*71
231Ø GOSUB384Ø         :REM*1Ø9
232Ø PRINTTAB(51)"LOADING ";IN$
                       :REM*11
233Ø QA=QN             :REM*195
234Ø IFA$="Y"ANDQNTHENQN=QN+QT:
    GOTO236Ø           :REM*32
235Ø QN=QT:QT=Ø:QA=Ø   :REM*162
236Ø FORX=QA+1 TOQN    :REM*127
237Ø IFX>1ØØTHENGOSUB383Ø:QN=1Ø
    Ø:GOTO242Ø         :REM*77
238Ø FORI=ØTO7         :REM*162
239Ø INPUT#2,CA$(X,I)  :REM*251
24ØØ IFI=3ANDRIGHT$(CA$(X,I),1)
    <>"M"THENI=7       :REM*115
241Ø NEXT:NEXT         :REM*237
242Ø CLOSE2:CLOSE15    :REM*214
243Ø RETURN             :REM*6
244Ø REM ERROR REPORT   :REM*58
245Ø PRINT"{SHFT CLR}"TAB(163)"
    SORRY FRIEND, BUT THE PROB
    LEM IS:            :REM*113
246Ø PRINT"{CRSR DN}{3 SPACEs}"
    ;EM$               :REM*91
247Ø CLOSE2:CLOSE15     :REM*27
248Ø GOSUB112Ø         :REM*23Ø
249Ø RETURN             :REM*66
25ØØ REM QUESTION ENTRY:REM*242
251Ø PRINT"{SHFT CLR}{CRSR DN}{
    3 SPACEs}THIS IS A {CTRL 9
    }";                :REM*132
252Ø FORI=1TO4:IFP$=MID$("EFMT"
    ,I,1)THENP=I       :REM*123
253Ø NEXT              :REM*11Ø
254Ø PRINTPZ$(P);"{CTRL Ø} QUES
    TION"              :REM*194
255Ø IFP$="F"THENPRINT"{5 SPACE
    s}USE {CTRL 9}{SHFT C}=@{C
    TRL Ø} KEYS TO MAKE BLANKS
                       :REM*83
256Ø PRINT"{CRSR DN}USE <SHIFT>
    <SPACE> TO INSERT BLANK LI
    NE                 :REM*2Ø7
257Ø PRINT"PLAIN <RETURN> ENTER
    S A NULL LINE THAT{2 SPACE
    s}WON'T BE PRINTED.:REM*46
258Ø PRINT"{CRSR DN}YOU MAY ENT
    ER 4 LINES OF 6Ø CHARACTER
    S{2 SPACEs}AFTER THE QUOTE
     MARK.             :REM*169
259Ø PRINT"THAT IS ONCE ACROSS
    AND BACK TO{9 SPACEs}THIS
    LINE{9 SPACEs}{2 SHFT *s}>
    {SHFT -}{CRSR DN}{CRSR LF}
    {SHFT -}           :REM*242
26ØØ PRINT"ENTER QUESTION #:"ST
    R$(QN)             :REM*158►
```


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```
261Ø RETURN                :REM*2Ø2
262Ø PRINT"ANSWER - ";CHR$(189+
     SN)                   :REM*64
263Ø REM INPUT QUESTIONS W/OUT
     ?                     :REM*95
264Ø IFPEEK(82Ø)<>Ø THEN266Ø
                           :REM*152
265Ø POKE631,34:POKE632,141:POK
     E633,145:POKE634,29:POKE19
     8,4:GOTO267Ø:REM C=64
                           :REM*46
266Ø POKE842,34:POKE843,141:POK
     E844,145:POKE845,29:POKE2Ø
     8,4:REM{2 SPACEs}C=128
                           :REM*28
267Ø OPEN1,Ø:INPUT#1,I$:PRINT:C
     LOSE1                 :REM*247
268Ø I$=LEFT$(I$,6Ø)       :REM*184
269Ø IFI$=""THENI$="."     :REM*15Ø
27ØØ RETURN                :REM*17
271Ø REM HELP              :REM*75
272Ø PRINT"{SHFT CLR}"TAB(1Ø)BQ
     $                     :REM*168
273Ø PRINT"{CRSR DN}{2 SPACEs}{
     CTRL 9}E{CTRL Ø}NTER {CTRL
      9}MASTER{CTRL Ø} FILE QUE
     STIONS AS {CTRL 9}E{CTRL Ø
     }SSAY,                :REM*42
274Ø PRINT"{3 SPACEs}{CTRL 9}M{
     CTRL Ø}ULTIPLE CHOICE, {CT
     RL 9}T{CTRL Ø}-F OR {CTRL
     9}F{CTRL Ø}ILL BLANKS
                           :REM*94
275Ø PRINT"{5 SPACEs}{6Ø CHARAC
     TERS PER LINE MAXIMUM)
                           :REM*35
276Ø PRINT"{4 SPACEs}MAY USE CO
     MMAS OR COLONS {CTRL 9}NO{
     CTRL Ø} QUOTES        :REM*198
277Ø PRINT"{CRSR DN}{2 SPACEs}{
     CTRL 9}${CTRL Ø} OR {CTRL
     9}4{CTRL Ø} LISTS {CRSR UP
     }";BQ$;" FILES.       :REM*8
278Ø PRINT"{2 SPACEs}{CTRL 9}R{
     CTRL Ø}EVIEW LISTS {CTRL 9
     }MASTER{CTRL Ø} FILE NUMBE
     RS                    :REM*227
279Ø PRINT"{2 SPACEs}{CTRL 9}D{
     CTRL Ø}ELETE OR {CTRL 9}C{
     CTRL Ø}ORRECT {CTRL 9}MAST
     ER{CTRL Ø} FILE ONLY.
                           :REM*131
28ØØ PRINT"{2 SPACEs}{CTRL 9}P{
     CTRL Ø}RINT FROM {CTRL 9}M
     ASTER{CTRL Ø} FILE OR {CTR
     L 9}TEST{CTRL Ø} FILE.
                           :REM*87
281Ø PRINT"{CRSR DN}{2 SPACEs}{
     CTRL 9}T{CTRL Ø}RANSFER OR
      {CTRL 9}N{CTRL Ø}EW TEST
     FROM {CTRL 9}MASTER{CTRL Ø
     } TO                  :REM*137
282Ø PRINT"{5 SPACEs}{CTRL 9}TE
     ST{CTRL Ø} FILE (5Ø QUESTI
     ONS LIMIT)            :REM*16
283Ø PRINT"{CRSR DN}{2 SPACEs}{
     CTRL 9}{UP ARROW}{CTRL Ø}
     FOR SUPERSCRIPT - {CTRL 9}
     {LB.}{CTRL Ø} FOR SUBSCRIP
     T                     :REM*73
284Ø PRINT "{2 SPACEs}USE {CTRL
      9}{LEFT ARROW}{CTRL Ø} TO
      RETURN TO LINE IF REGULAR
                           :REM*16Ø
285Ø PRINT "{2 SPACEs}SUPER-SUB
     SCRIPTS ELSE OPPOSITE ({CT
     RL 9}{UP ARROW}{LB.}{CTRL
     Ø})                   :REM*41
286Ø PRINT"{CRSR DN}{2 SPACEs}{
     CTRL 9}GOTO 19Ø{CTRL Ø} TO
      RE-ENTER AND SAVE DATA.
                           :REM*1Ø5
287Ø GOSUB379Ø:RETURN      :REM*243
288Ø REM TRANSFER          :REM*197
289Ø PRINT"{SHFT CLR}{2 CRSR DN
     s} QUESTION TRANSFER ROUTI
     NE"                   :REM*37
29ØØ IFCA$(1,Ø)=""THENGOTO32ØØ
                           :REM*73
291Ø PRINT"{CRSR DN} YOU MAY TR
     ANSFER QUESTIONS FROM THE
                           :REM*251
292Ø PRINT" MASTER FILE TO YOUR
      TEST FILE BY.        :REM*134
293Ø PRINT" ENTERING THE QUESTI
     ON NUMBER.{CRSR DN}"
                           :REM*171
294Ø PRINT" THE QUESTIONS WILL
     BE ENTERED"           :REM*63
295Ø PRINT" IN THE ORDER YOU SE
     LECT AND WILL         :REM*78
296Ø PRINT" BE PRINTED OR SAVED
      IN THAT ORDER.{CRSR DN}"
                           :REM*134
297Ø GOSUB379Ø             :REM*9
298Ø PRINT"{2 CRSR UPs} TO STAR
     T A NEW FILE PRESS 'N'"
                           :REM*194
299Ø PRINT" OTHERWISE THE QUEST
     IONS WILL BE          :REM*73
3ØØØ PRINT" ADDED TO YOUR TEST.
                           :REM*237
3Ø1Ø GOSUB381Ø             :REM*3Ø
3Ø2Ø IFA$="N"THENNQ=Ø      :REM*87
3Ø3Ø NQ=NQ+1               :REM*234
3Ø4Ø IFNQ>5ØTHENGOSUB383Ø:RETUR
     N                     :REM*45
3Ø5Ø INPUT"{SHFT CLR}{CRSR DN}
     WHICH QUESTION FROM MASTER
      FILE";Q$             :REM*45
3Ø6Ø Q=VAL(Q$):PRINT        :REM*78
3Ø7Ø IFCA$(Q,Ø)=""THENPRINT" {C
     TRL 9}INVALID NUMBER":GOSU
     B112Ø:RETURN          :REM*231
3Ø8Ø FOR X=ØTO3:CB$(NQ,X)=CA$(Q
     ,X):NEXT              :REM*199
3Ø9Ø IFRIGHT$(CB$(NQ,3),1)<>"M"
     THEN311Ø              :REM*178
31ØØ FOR X=4TO7:CB$(NQ,X)=CA$(Q
     ,X):NEXT              :REM*155
311Ø PRINTNQ;" ";CB$(NQ,Ø):PRIN
     T                     :REM*222
312Ø FORI=1TO3:PRINTTAB(5)I;CB$
     (NQ,I):NEXT           :REM*69
313Ø IFRIGHT$(CB$(NQ,3),1)<>"M"
     THEN317Ø              :REM*235
314Ø FORI=4TO7             :REM*175
315Ø PRINTTAB(6)CHR$(189+I);" "
     ;CB$(NQ,I)            :REM*175
316Ø NEXT                  :REM*214
317Ø PRINT"{CRSR DN}{2 SPACEs}A
     NOTHER QUESTION?":GOSUB381
     Ø                     :REM*234
318Ø IFA$="Y"THEN3Ø3Ø      :REM*142
319Ø RETURN                :REM*9
32ØØ PRINT"{2 CRSR DNs} {CTRL 9
     } THERE ARE NO FILES IN TH
     E MEMORY. ":GOSUB112Ø:RETU
     RN                    :REM*49
321Ø REM PICK OUT RANDOM QUESTI
     ONS                   :REM*64
322Ø PRINT"{SHFT CLR}{2 CRSR DN
     s}{4 SPACEs}RANDOM QUESTIO
     N SELECTION{CRSR DN}"
                           :REM*9
323Ø IFCA$(1,Ø)=""THENGOTO32ØØ
                           :REM*134
324Ø PRINT"{2 SPACEs}YOU HAVE";
     QN;"QUESTIONS IN THE MEMOR
     Y                     :REM*44
325Ø PRINT"{2 SPACEs}YOU MAY MA
     KE A RANDOM TEST USING
                           :REM*17Ø
326Ø IFQN<5ØTHENQM=QN-1:GOTO328
     Ø                     :REM*158
327Ø QM=5Ø                 :REM*154
328Ø PRINT"{2 SPACEs}UP TO";QM;
     "QUESTIONS.           :REM*27
329Ø INPUT"{2 CRSR DNs}{2 SPACE
     s}HOW MANY QUESTIONS DO YO
     U WANT";AT$           :REM*135
33ØØ AT=VAL(AT$):IFAT<1THENRETU
     RN                    :REM*124
331Ø IFAT>5Ø ORAT>QN-1 THENPRIN
     T"{2 SPACEs}THAT'S TOO MAN
     Y QUESTIONS!!":GOTO329Ø
                           :REM*155
332Ø PRINT"{SHFT CLR}"TAB(12Ø)"
     HAVE A LITTLE PATIENCE
                           :REM*213
333Ø PRINT"{CRSR DN}{3 SPACEs}I
     'M WORKING ON IT!!:REM*24Ø
334Ø FORX=1TOAT:FORI=ØTO7
                           :REM*186
335Ø CB$(X,I)=".ØE"        :REM*59
336Ø NEXT:NEXT             :REM*147
337Ø REM RANDOM GENERATOR
                           :REM*242
338Ø A=QN:L=AT             :REM*213
339Ø N=1                   :REM*14Ø
34ØØ X=INT(RND(Ø)*A+1):IFN>1THE
     N343Ø                 :REM*155
341Ø P(N)=X:N=N+1          :REM*211
342Ø IFN=L+1THEN345Ø       :REM*66
343Ø FORM=1TON:IFX=P(M)THEN34ØØ
                           :REM*12Ø
344Ø NEXTM:GOTO341Ø        :REM*122
345Ø FORNQ=1TOAT           :REM*157
346Ø FORI=ØTO7             :REM*254
347Ø CB$(NQ,I)=CA$(P(NQ),I)
                           :REM*231
348Ø IFRIGHT$(CB$(NQ,Ø),1)="M"T
     HEN35ØØ               :REM*246
349Ø IFI>2THENI=7          :REM*52
35ØØ NEXT:NEXT             :REM*56
351Ø NQ=AT                 :REM*119
352Ø RETURN                :REM*64
```


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```
353Ø REM CORRECT          :REM*217
354Ø PRINT"{SHFT CLR}{2 CRSR DN
     s}{6 SPACEs}CORRECT QUESTI
     ONS                  :REM*159
355Ø IFCA$(1,Ø)=""THENGOTO32ØØ
                          :REM*193
356Ø INPUT"{2 CRSR DNs}{2 SPACE
     s}WHICH QUESTION NUMBER";C
     $                    :REM*243
357Ø B=VAL(C$)            :REM*216
358Ø IFB<1ORB>QNTHEN354Ø:REM*73
359Ø H$=RIGHT$(CA$(B,Ø),2)
                          :REM*7
36ØØ P$=RIGHT$(CA$(B,Ø),1)
                          :REM*4
361Ø FORI=1TO4:IFP$=MID$("EFMT"
     ,I,1)THENP=I:NEXT :REM*174
362Ø PRINT"{SHFT CLR}{CRSR DN}
     CORRECT {CTRL 9}";PZ$(P);"
     {CTRL Ø}QUESTION:";B:I=O
                          :REM*2
363Ø PRINT:FORX=ØTO7      :REM*24Ø
364Ø IFX>3ANDP$<>"M"THEN367Ø
                          :REM*139
365Ø IFX=4THENPRINT"{2 SPACEs}A
     NSWERS               :REM*121
366Ø PRINT"{CTRL 9}"X"{CTRL Ø}"
     ;LEFT$(CA$(B,X),LEN(CA$(B,
     X))-2)               :REM*218
367Ø NEXT                 :REM*214
368Ø INPUT"{CRSR DN}CORRECT WHI
     CH LINE";I           :REM*127
369Ø IFI<ØORI>7THENPRINT"{2 CRS
     R UPs}":GOTO368Ø     :REM*32
37ØØ IFI>3ANDP$<>"M"THENPRINT"{
     2 CRSR UPs}":GOTO368Ø
                          :REM*12Ø
371Ø PRINT"{SHFT CLR}{CRSR DN}{
     4 SPACEs}CORRECT LINE THEN
      HIT <RETURN>        :REM*94
372Ø REM                  :REM*24
373Ø PRINT"{CRSR DN} ----------
     ------------------------
                          :REM*26
374Ø PRINT"{CRSR DN} ";LEFT$(CA
     $(B,I),LEN(CA$(B,I))-2):PR
     INT"{HOME}"TAB(2ØØ):REM*48
375Ø GOSUB264Ø            :REM*232
376Ø IFI$=""THENI$="."    :REM*2ØØ
377Ø CA$(B,I)=I$+H$       :REM*74
378Ø RETURN               :REM*93
379Ø PRINTTAB(46)"PRESS ANY KEY
      TO CONTINUE"        :REM*61
38ØØ GETA$:IFA$<>""THEN38ØØ
                          :REM*86
381Ø GETA$:IFA$=""THEN381Ø
                          :REM*191
382Ø RETURN               :REM*117
383Ø PRINT"{SHFT CLR}{3 CRSR DN
     s}{3 SPACEs}{CTRL 9}THE FI
     LE IS FULL":GOSUB112Ø:RETU
     RN                   :REM*134
384Ø PRINTCHR$(14):POKE53281,6:
     POKE5328Ø,6          :REM*127
385Ø PRINT"{SHFT CLR}{CTRL 2}"T
     AB(24Ø)TAB(24Ø)      :REM*81
386Ø PRINTTAB(14Ø)"THE QUESTION
      BOX                 :REM*1Ø6
387Ø PRINTTAB(21)"BY      :REM*158
388Ø PRINTTAB(22)"HUGH MCMENAMI
     N                    :REM*231
389Ø PRINTTAB(23)"RUN OCT 1988{
     CRSR DN}             :REM*239
39ØØ RETURN               :REM*197
391Ø DATA"ESSAY{6 SPACEs}","FIL
     L BLANK ","MULT-CHOICE","T
     RUE-FALSE "          :REM*1Ø8
392Ø DATA" ESSAY "," FILL BLANK
     S "," MULTIPLE CHOICE ","
     TRUE-FALSE "         :REM*29
```

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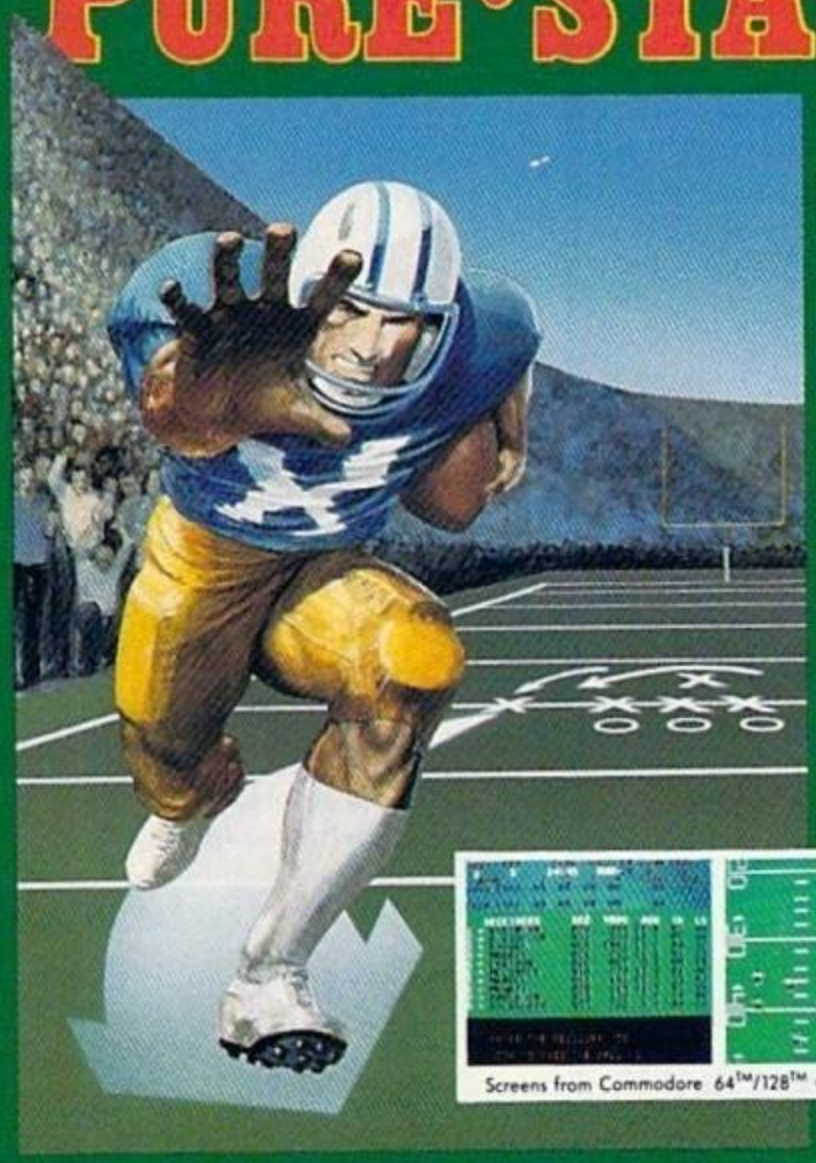
PURE·STAT FOOTBALL



The authors of **Pure-Stat Baseball** and **Pure-Stat College Basketball** introduce their most precise simulation to date, **PURE-STAT FOOTBALL! This third generation** football game has a wide array of innovative features that include: Computer Coaching using artificial intelligence to select offensive/defensive plays, Vertical and Horizontal Scrolling of on-field action, a built-in Stat Compiler, and much more. PURE-STAT FOOTBALL will challenge even the most avid fan!

- For zero, one, or two players
- Statistically based program where Pro-Football players and teams perform as they did in real life
- Built-in Stat Compiler that includes League Standings
- Full screen graphics with 22 animated players (No X's and O's)
- Eight types of runs, 12 types of passes
  - *Draw Plays, Reverses, Screen Passes*
  - *Blitz Linebackers, Double Team Receivers*
  - *Zone Defense, Prevent Defense*
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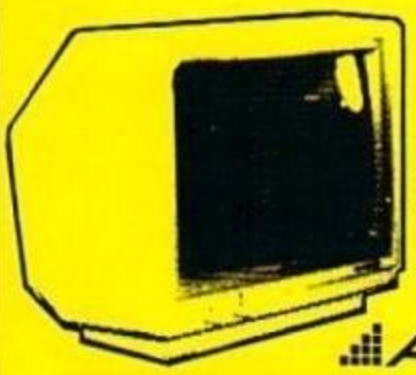

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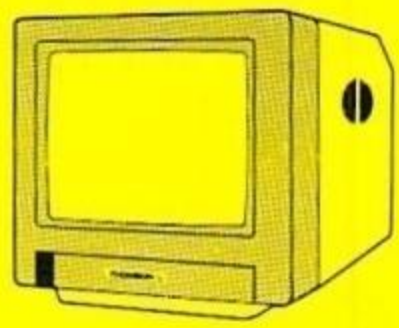

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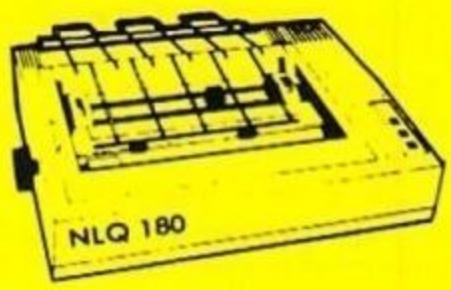

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Easy Banners

Use this C-64/C-128 utility to print lengthy banners for any occasion.

By JOHN RYAN

Whether it be a birthday party for your five-year-old or a welcome-home celebration for a loved one, almost everyone needs to create a quick sign or banner at one point or another. While most printer utilities limit you to printing messages on a single sheet of paper, Easy Banner will print any message sideways, enabling you to create banners as long as your imagination or pocketbook allows.

Although the program is deceptively short, Easy Banner is flexible enough to meet the needs of most occasions. It may be loaded in either C-128 40-Column mode or in C-64 mode, and there are four options in the program. The first lets you choose the height of the characters you wish to print (1–8, smallest to largest). Then, under this option, you may wish to elect an expanded print character at the prompt, since the largest sizes (7 and 8) tend to be vertically elongated and thus hard to read at close range.

The second option lets you specify the character you wish to print your banner with; this may be any Commodore keyboard character. Finally, select option three to enter the message you want printed, first making sure that the printer is connected and turned on, and that any special features have been disabled (most notably, skip-perforation DIP switches). The fourth option lets you exit the program.

Easy Banner will handle inputs of up to 80 characters at a time, which, believe me, will use a tremendous amount of paper. Of course, you may create longer messages by simply appending separate banners.

The program should be compatible with most dot matrix and letter-quality printers. So next time, don't paint it. . .print it!—with Easy Banner. R

John Ryan, one of RUN*'s contributing editors, is an air traffic controller working in the computer-based instruction section. In his spare time, he pursues a computer science degree and shares with his wife the demands of a home and three children. Somehow, he manages to find time to write programs for this magazine.*

Listing 1. Easy Banner program.

```
10 REM EASY BANNER - JOHN RYAN                :REM*178
20 REM (C) RUN MAGAZINE 1988                  :REM*184
30 MD=PEEK(4096Ø):POKE 254,MD                 :REM*191
40 I=12288:EX=Ø:CH=1:CH$="{SHFT
   Q}":P$=CH$:SP$=" "  :REM*86
50 READ A:IF A=256 THEN 7Ø                    :REM*14Ø
60 POKE I,A:I=I+1:GOTO 5Ø                     :REM*41
70 POKE 53281,Ø:POKE 5328Ø,Ø:PR
   INTCHR$(147)CHR$(142)CHR$(3Ø
   ):SC=1147:                 :REM*99
80 BASE=12544:C$=""           :REM*2Ø8
90 PRINT TAB(14)"EASY BANNER":P
   RINT                       :REM*18Ø
100 PRINT:PRINTTAB(7)"{CTRL 9}[
    1]{CTRL Ø} SELECT CHARACTER
    SIZE"                     :REM*15
110 PRINT:PRINTTAB(7)"{CTRL 9}[
    2]{CTRL Ø} SELECT PRINT CHA
    RACTER"                   :REM*21Ø
120 PRINT:PRINTTAB(7)"{CTRL 9}[
    3]{CTRL Ø} PRINT BANNER":PR
    INT                       :REM*77 ►
```

RUN it right: **C-64; C-128 (in 40-Column mode); printer**

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EASY BANNERS

```
130 PRINTTAB(7)"{CTRL 9}[4]{CTR
    L Ø} END"              :REM*62
140 POKE 198,Ø             :REM*9
150 GETA$:IF A$="" THEN150
                           :REM*57
160 A=VAL(A$):IF A<1 OR A>4 THE
    N 150                  :REM*180
170 ON A GOSUB 190,250,260,180:
    GOTO70                 :REM*219
180 PRINTCHR$(147):END :REM*217
190 PRINT                  :REM*86
200 INPUT "CHARACTER SIZE (1-8)
    ";CH:IF CH<1 OR CH>8 THEN P
    RINT"{CRSR UP}";:GOTO 200
                           :REM*89
210 INPUT"EXPANDED CHARACTER (Y
    /N)";EX$:IF EX$="Y" THEN EX
    =1:GOTO 230            :REM*215
220 EX=Ø                   :REM*163
230 P$="":SP$=P$:FOR I=1 TO CH:
    P$=P$+CH$:SP$=SP$+" ":NEXTI
    :                      :REM*11
240 RETURN                 :REM*127
250 PRINT:INPUT"ENTER PRINT CHA
    RACTER";CH$:GOTO 230
                           :REM*157
260 PRINTCHR$(147)"{2 CRSR RTs}
    ENTER MESSAGE (80 CHARACTER
    S OR LESS)             :REM*236
270 INPUT"{HOME}{3 CRSR DNs}>";
    W$:IFW$=""THEN260      :REM*90
280 N=(80-(CH*8))/2 :FORJ=1 TO
    N:C$=C$+" ":NEXTJ      :REM*244
290 OPEN 1,4:W=LEN(W$):I=Ø:A=Ø
                           :REM*216
300 D=PEEK(SC)             :REM*Ø
310 POKE 253,D:SYS 12288:SA=128
    ØØ                     :REM*39
320 PRINT#1,C$;            :REM*229
330 FOR J=Ø TO 63:IF PEEK(BASE+
    J)<>Ø THENPRINT#1,P$;:GOTO3
    5Ø                     :REM*219
340 PRINT#1,SP$;           :REM*43
350 A=A+1:IFA=8THENA=Ø:PRINT#1,
    CHR$(13);C$;:GOTO 370
                           :REM*11
360 GOTO 410               :REM*175
370 IF EX<>1THEN 410       :REM*212
380 FOR N=Ø TO 7:IF PEEK(SA+N)<
    >Ø THENPRINT#1,P$;:GOTO400
                           :REM*105
390 PRINT#1,SP$;           :REM*93
400 NEXTN:SA=SA+8:PRINT#1,CHR$(
    13);C$;                :REM*209
410 NEXTJ:I=I+1:SC=SC+1:IFI<>W
    THEN300                :REM*46
420 CLOSE1:RETURN          :REM*137
430 DATA 169,Ø,133,251,133,252,
    170,157,Ø,49,157,Ø,50,232,2
    24,64,208,245          :REM*195
440 DATA 166,253,240,16,24,165,
    251,105,8,133,251,165,252,1
    05,Ø,133,252,202       :REM*246
450 DATA 208,240,24,165,251,105
    ,Ø,133,251,165,252,105,208,
    133,252,120,165        :REM*209
460 DATA 254,240,9,165,1,41,251
    ,133,1,76,70,48,169,1,141,Ø
    ,255,169,Ø,141         :REM*164
470 DATA 171,48,169,8,141,167,4
    8,169,128,141,170,48,160,7,
    162,Ø,177,251,45       :REM*255
480 DATA 170,48,208,35,232,136,
    16,245,238,171,48,78,170,48
    ,206,167,48,208        :REM*132
490 DATA 230,165,254,208,8,169,
    Ø,141,Ø,255,76,129,48,165,1
    ,9,4,133,1,88,96       :REM*43
500 DATA 142,169,48,24,174,171,
    48,189,159,48,109,169,48,17
    Ø,169,42,157,Ø         :REM*67
510 DATA 49,157,Ø,50,174,169,48
    ,76,96,48,Ø,8,16,24,32,40,4
    8,56,Ø,Ø,Ø,Ø,Ø         :REM*45
520 DATA 256               :REM*98
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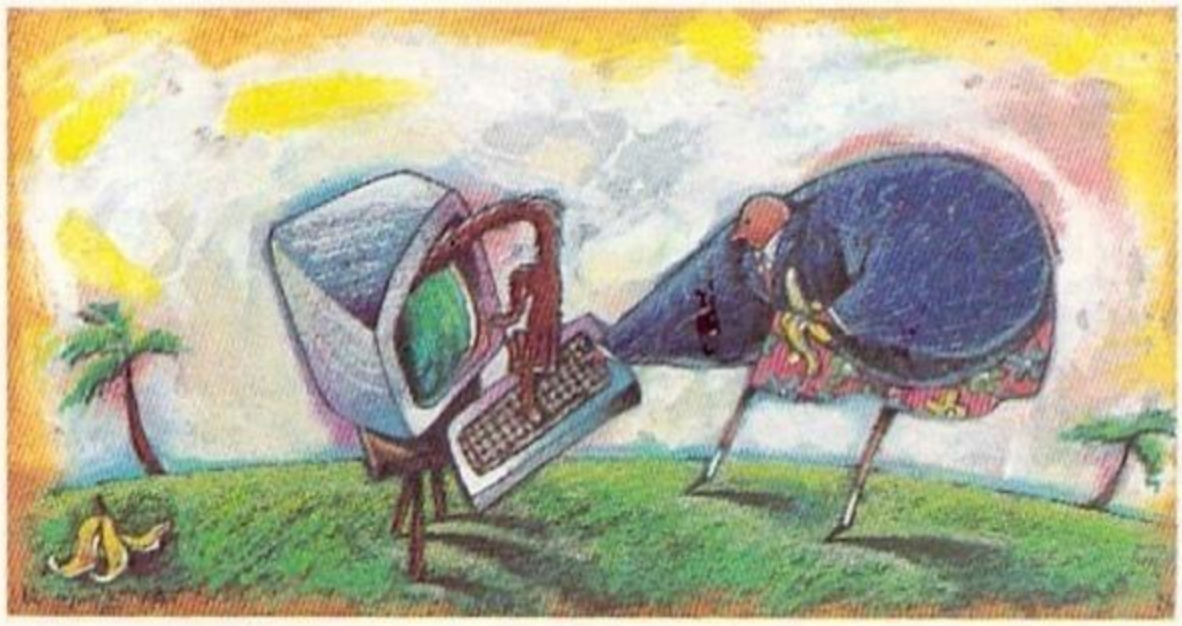

By JEROME REUTER

You're probably familiar with the game called Simon Says, or Follow Me. You may even have one of those little plastic boxes with four buttons on it—and a dead battery inside—lurking in a closet. Well, here's a program for the C-128 that brings the game to life. Called Monkey See, it replaces the plastic box with the 40-column screen and the C-128's keypad. Instead of a blinking colored light, you see animated sprites on a colorful background, and the sound is much superior to the buzz of the original game.

After typing in Listing 1, save a copy to disk; then run the program. It boots up with the difficulty level set at E, for easy, but you can change that to medium, hard or impossible by pressing any key to cycle through the options, and then the return key to select your challenge.

The screen shows four boxes, or "pads," arranged like the 2, 4, 6 and 8 keys on the keypad, with a musical note sprite in the area in the middle. The computer plays a note by "pressing" on one of the pads with the movable note sprite. Then it waits for you to play the same note with keypad number 2, 4, 6 or 8. After you play the note, Monkey See ups the ante by playing the first note again, and then another. This pattern of adding notes continues until you make a mistake or exhaust the level you've preset.

If you make a mistake, the screen offers the options of hearing the last sequence played correctly, starting the game again or quitting.

Monkey See is written in Basic, with Data statements at the end for the sprite data and the actual key sequence. Don't think for a moment that the game won't be random enough with the key sequences in an array. While the array holds a sequence of only 100 keys, there are over 50 random starting positions.

The listing lines are numbered by two's, so you can use your auto numbering system and still have room to add custom comments where needed. The difficulty levels are set in lines 98–104 and should provide the amount of challenge you need. The sprite movement is set in lines 88–96. A variable empty timing loop in those lines keeps shortening the time between notes until either you or the computer gives up.

One caution: Monkey See is good fun for all ages, so don't turn up the volume too loud. Otherwise, you'll have a number of people standing behind you, all yelling, "I'm next!" R

Jerome Reuter is a retired naval officer who runs a small contracting business. He's written all the software for his firm and has had a number of programs published.

Listing 1. Monkey See program.

```
Ø REM MONKEY SEE - JEROME REUTE
  R                          :REM*251
2 PRINT"{SHFT CLR}{CTRL 1}":POK
  E 5328Ø,14:POKE 53281,14
                             :REM*2ØØ
4 DIM ZZ(1ØØ):W$="{CTRL 2}{HOME
  }{5 CRSR DNs}{4 CRSR RTs}":Y$
  ="{HOME}{9 CRSR DNs}":X$="{HO
  ME}{23 CRSR DNs}"          :REM*51
6 FOR I=Ø TO 128:READ S:POKE 35
  84+I,S:NEXT:FOR X=1 TO 1ØØ:RE
  AD ZZ(X):NEXT              :REM*122
8 PRINT"{CTRL 9}{CTRL 7} MONKEY
   SEE, MONKEY DO - BY J.E. REU
  TER ":Q=Ø:N=Ø:A$=""        :REM*41
1Ø PRINT "{2 CRSR DNs}{3 CRSR R
  Ts}{CTRL 9}{CTRL 1}{3 SPACEs
  }{CTRL Ø}":PRINT "{3 CRSR RT
  s}{CTRL 9}{3 SPACEs}{CTRL Ø}
  ":PRINT "{3 CRSR RTs}{CTRL 9
  }{3 SPACEs}{CTRL Ø}{3 CRSR U
  Ps}":PRINT TAB(13) "{3 CRSR
  DNs}{CTRL 9}{11 SPACEs}{CTRL
   Ø}":FOR X=1 TO 3:PRINT TAB(
  13) "{CTRL 9}{CTRL 1}{2 SPAC
  Es}{CTRL 3}{7 SPACEs}{CTRL 1
  }{2 SPACEs}{CTRL Ø}":NEXT
                             :REM*214
12 PRINT TAB(7) "{CTRL 9}{23 SP
  ACEs}{CTRL Ø}":FOR X=1 TO 5:
  PRINT TAB(7) "{CTRL 9} {CTRL
   8}{4 SPACEs}{CTRL 1}{3 SPAC ►
```

RUN it right: **C-128, in 40-Column mode**

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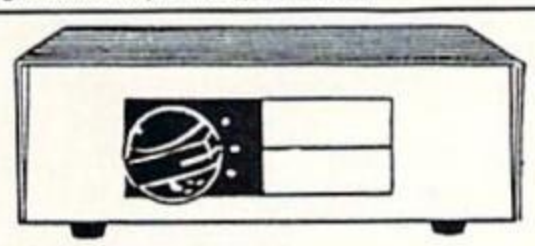

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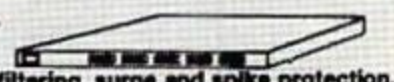

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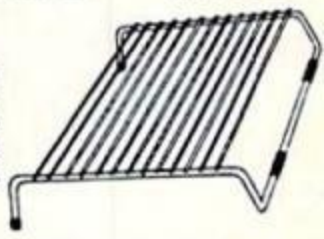

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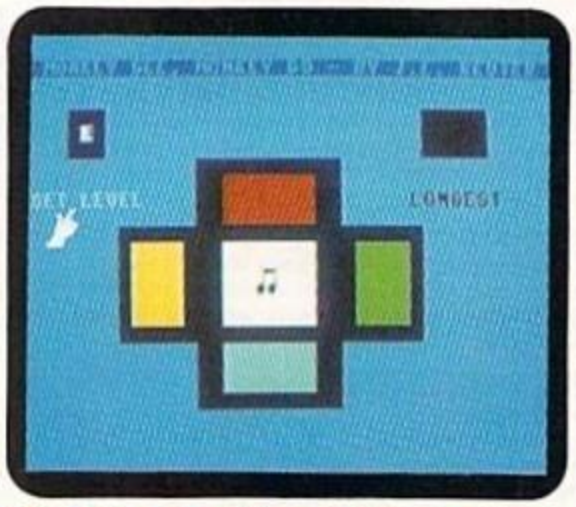
MONKEY SEE

```
   Es}{CTRL 2}{7 SPACEs}{CTRL 1
   }{3 SPACEs}{CTRL 6}{4 SPACEs
   }{CTRL 1} ":NEXT      :REM*13
14 PRINT TAB(7) "{CTRL 9}{23 SP
   ACEs}{CTRL Ø}"        :REM*11
16 FOR X=1 TO 3:PRINT TAB(13) "
   {CTRL 9}{CTRL 1}{2 SPACEs}{C
   TRL 4}{7 SPACEs}{CTRL 1}{2 S
   PACEs}{CTRL Ø}":NEXT:PRINT T
   AB(13) "{CTRL 9}{CTRL 1}{11
   SPACEs}{CTRL Ø}"     :REM*118
18 CHAR1,3Ø,4,"{5 SPACEs}",1:CH
   AR1,3Ø,5,"{5 SPACEs}",1:CHAR
   1,3Ø,6,"{5 SPACEs}",1:CHAR1,
   29,9,"LONGEST"       :REM*211
2Ø MOVSPR 1,158,153:SPRITE 1,1,
   1,Ø,Ø,Ø,Ø:GOSUB 9Ø:PRINT Y$
   "{CTRL G}{CTRL 4}SET LEVEL"
                        :REM*74
22 PRINT W$ "E":GETKEY A$:IF A$
   =CHR$(13) THEN LV$="E":GOTO
   32:REM E-ASY         :REM*44
24 PRINT W$ "M":GETKEY A$:IF A$
   =CHR$(13) THEN LV$="M":GOTO
   32:REM M-EDIUM       :REM*124
26 PRINT W$ "H":GETKEY A$:IF A$
   =CHR$(13) THEN LV$="H":GOTO
   32:REM H-ARD         :REM*147
28 PRINT W$ "I":GETKEY A$:IF A$
   =CHR$(13) THEN LV$="I":GOTO
   32:REM I-MPOSSIBLE   :REM*2
3Ø GOTO 22              :REM*16Ø
32 PRINT W$ " {CTRL 9}{CTRL 1}
   {CTRL Ø}{9 SPACEs}":PRINT Y$
    "{CTRL 8}GET READY":SLEEP 2
   :MOVSPR 2,33,97:Q=INT(RND(1)
   *75)+1:N=Q           :REM*44
34 SLEEP 1:FOR L=Q TO N:PRINT Y
   $ "{CTRL 1}MY TURN{2 SPACEs}
   "                    :REM*38
36 IF ZZ(L)=1 THEN GOSUB 88:GOT
   O 44                 :REM*35
38 IF ZZ(L)=2 THEN GOSUB 92:GOT
   O 44                 :REM*247
4Ø IF ZZ(L)=3 THEN GOSUB 94:GOT
   O 44                 :REM*2Ø9
42 IF ZZ(L)=4 THEN GOSUB 96:GOT
   O 44                 :REM*5Ø
44 NEXT L               :REM*71
46 FOR K=Q TO N:PRINT Y$ "{CTRL
    2}YOUR TURN":GETKEY A$
                        :REM*54
48 IF (A$="8"ANDZZ(K)=1) THEN G
   OSUB 88:GOTO 58      :REM*184
5Ø IF (A$="6"ANDZZ(K)=2) THEN G
   OSUB 92:GOTO 58      :REM*2
52 IF (A$="2"ANDZZ(K)=3) THEN G
   OSUB 94:GOTO 58      :REM*226
54 IF (A$="4"ANDZZ(K)=4) THEN G
   OSUB 96:GOTO 58      :REM*188
56 IF (A$<>"8"ORA$<>"6"ORA$<>"2
   "ORA$<>"4") THEN 62 :REM*156
58 A$="":IF K=N THEN GOTO 98
                        :REM*64
6Ø NEXT K               :REM*85
62 FOR T=1 TO 5:SOUND 3,5ØØØ,9:
   NEXT                 :REM*1ØØ
64 A$="":PRINT X$ "{CTRL 2}{3 S
   PACEs}{CTRL 9}L{CTRL Ø}{CTRL
```



Two, four, six, eight—play those notes; don't hesitate!

```
    1}AST SEQUENCE, {CTRL 2}{CT
   RL 9}E{CTRL 1}{CTRL Ø}ND OR
   {CTRL 2}{CTRL 9}P{CTRL Ø}{CT
   RL 1}LAY AGAIN{CTRL 2}":GETK
   EY A$                :REM*149
66 IF A$="P" THEN GOSUB 9Ø:PRIN
   T Y$ "PLAY AGAIN":SLEEP 1:RU
   N                    :REM*128
68 IF A$="L" THEN GOSUB 9Ø:PRIN
   T Y$ "LAST SEQ.":PRINT X$ "{
   36 SPACEs}":SLEEP 1:GOTO 74
                        :REM*123
7Ø SPRITE 1,Ø:SPRITE 2,Ø:PRINT
   "{SHFT CLR}{3 CRSR DNs}CURCU
   IT OVERLOAD":PRINT"{2 CRSR D
   Ns}";N-Q+1;" RIGHT KEY PRESS
   ES.":PRINT"{2 CRSR DNs}PLAY
   AGAIN (Y/N)"         :REM*31
72 GETKEY A$:IF A$="Y" THEN RUN
   :ELSE END            :REM*246
74 FOR L=Q TO N         :REM*2Ø4
76 IF ZZ(L)=1 THEN GOSUB 88:GOT
   O 84                 :REM*95
78 IF ZZ(L)=2 THEN GOSUB 92:GOT
   O 84                 :REM*18
8Ø IF ZZ(L)=3 THEN GOSUB 94:GOT
   O 84                 :REM*76
82 IF ZZ(L)=4 THEN GOSUB 96:GOT
   O 84                 :REM*174
84 NEXT L               :REM*111
86 GOTO 64              :REM*23Ø
88 MOVSPR 1,158,114:SOUND 1,75Ø
   ,15:PRINT W$ "8":FOR G=1 TO
   126-5*(N-Q):NEXT:MOVSPR 1,15
   8,153:RETURN         :REM*14
9Ø MOVSPR 2,33,127:SPRITE 2,1,2
   ,Ø,Ø,Ø,Ø:RETURN      :REM*73
92 MOVSPR 1,227,153:SOUND 1,1Ø5
   Ø,15:PRINT W$ "6":FOR G=1 TO
    126-5*(N-Q):NEXT G:MOVSPR 1
   ,158,153:RETURN      :REM*157
94 MOVSPR 1,158,194:SOUND 1,135
   Ø,15:PRINT W$ "2":FOR G=1 TO
    126-5*(N-Q):NEXT G:MOVSPR 1
   ,158,153:RETURN      :REM*137
96 MOVSPR 1,91,153:SOUND 1,165Ø
   ,15:PRINT W$ "4":FOR G=1 TO
   126-5*(N-Q):NEXT G:MOVSPR 1,
   158,153:RETURN       :REM*11Ø
98 IF (LV$="E" AND (Q+6)=N) THE
   N GOTO 1Ø8:REM 7 NOTES WINS
   'EASY'               :REM*21Ø
1ØØ IF (LV$="M" AND (Q+12)=N) T
   HEN GOTO 1Ø8:REM 13 NOTES W
   INS 'MEDIUM'         :REM*55
1Ø2 IF (LV$="H" AND (Q+17)=N) T
   HEN GOTO 1Ø8:REM 18 NOTES W
   INS 'HARD'           :REM*242
1Ø4 IF (LV$="I" AND (Q+24)=N) T
   HEN GOTO 1Ø8:REM 25 NOTES W
   INS 'IMPOSSIBLE'     :REM*185
1Ø6 PRINTW$TAB(3Ø)"{CTRL 9}{CTR
   L 1} {CTRL Ø}{CTRL 2}";N-Q+
   1:N=N+1:GOTO 34      :REM*47
1Ø8 PRINT "{SHFT CLR}{3 CRSR DN
   s}{3 CRSR RTs} YOU BEAT THE
    COMPUTER IN ";LV$;" LEVEL"
   :FOR K=1 TO 25:R=RND(Ø)*6ØØ
   ØØ:L=RND(Ø)*1Ø:SOUND 1,R,L,
   Ø,Ø,Ø,2               :REM*216
11Ø X=RND(Ø)*6ØØØØ:M=RND(Ø)*2Ø:
   SOUND 2,X,M,Ø,Ø,Ø,1:X=RND(Ø
   )*1ØØØØ:M=RND(Ø)*1Ø:SOUND 3
   ,X,M,Ø,Ø,Ø,Ø:NEXT K:GOTO 7Ø
                        :REM*48
112 REM SPRITE #1 (MUSICAL NOTE
   )                    :REM*98
114 DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø:REM*8Ø
116 DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø:REM*82
118 DATA Ø,Ø,Ø,63,192,Ø,63,192
                        :REM*183
12Ø DATA Ø,32,64,Ø,32,64,Ø,32
                        :REM*81
122 DATA 64,Ø,32,64,Ø,32,64,1
                        :REM*184
124 DATA 227,192,3,231,192,3,23
   1,192                :REM*71
126 DATA 3,231,192,1,195,128,Ø,
   Ø                    :REM*215
128 DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø:REM*78
13Ø REM SPRITE #2 (POINTING HAN
   D)                   :REM*245
132 DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø:REM*66
134 DATA Ø,Ø,Ø,96,Ø,Ø,192,Ø
                        :REM*128
136 DATA 193,128,Ø,227,Ø,Ø,1Ø2,
   Ø                    :REM*216
138 DATA Ø,1Ø9,128,Ø,235,96,Ø,2
   22                   :REM*5
14Ø DATA 216,1,255,176,1,255,22
   4,1                  :REM*113
142 DATA 255,192,3,255,128,3,25
   4,Ø                  :REM*7
144 DATA 7,248,Ø,15,24Ø,Ø,31,24
   Ø                    :REM*18Ø
146 DATA Ø,63,224,Ø,127,224,Ø,Ø
                        :REM*25Ø
148 REM KEY SEQUENCE WITH RANDO
   M START - ANY ORDER OF ONES
   ,TWOS,THREES & FOURS
                        :REM*177
15Ø DATA 1,4,3,3,2,3,1,3,2,1,4,
   4,1,2,4,3,2,3,2,4,1,1,4,2,3
   ,4,1,2,2,3,4,1,2,3 :REM*253
152 DATA 2,3,1,2,4,3,2,1,2,3,2,
   4,2,3,4,2,1,3,2,1,1,3,3,4,4
   ,3,4,1,2,3,4,3,2,4 :REM*216
154 DATA 2,4,2,4,1,3,2,3,2,4,2,
   1,2,4,2,3,2,4,2,1,2,1,1,2,1
   ,2,3,3,4,1,4,1,4,3 :REM*1Ø8 ■
```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COMMONSENSE APPROACH TO COMPUTING

1. The best arrangement for your computer system is to plug your components into a power strip, which you should shut off when not using your computer. If you don't have a power strip, be sure to always unplug your power supply when you're not using your computer. Even though your computer is off, your power supply can overheat.

2. Water can destroy data on your disk. Avoid storing your disks in excessively humid conditions. Also avoid extremes of hot and cold, which may distort or compromise the reliability of the data on your disk. Try to keep 'em at room temperature.

3. To keep your disk drive from overheating, raise it to allow air to circulate under and over it. To cool off their drives, computerists have devised many different methods—for example, spent bullet shells or sawed-off pencils in the drive's screw holes, fans directed at the unit or paper chimneys over the drive's vents!

4. If you spend a lot of time in front of your computer monitor, you run the risk of eyestrain. Get an anti-glare shield, which will also protect you from radiation and eliminate static shock. Staring at a computer screen a lot can also cause headaches, fatigue, irritability and facial twitches. Here are some things you can do:
—take a visual break every 20 minutes. Focus on different distances.
—if you don't have an anti-glare shield, make sure there are no bright lights reflecting off the screen and into your eyes. Also, don't locate your computer by, or directly in front of, a window. The contrast between the outside brightness and the low-level lighted screen can cause eyestrain.
—according to optometrists, green letters on a green screen is the worst combination for your eyes; amber screens are better; but black-and-white screens are best.

5. Sitting for long hours in front of your monitor can also cause back, neck and shoulder strain; slow blood circulation in the legs; and slacken muscle tone. An ergonomically designed chair can minimize these health hazards and muscular aches. Also, constantly changing your sitting position and good body posture with feet firmly on the floor can help.

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Scared Silly!

Boo! This Halloween, be the hit of the neighborhood with this animated video pumpkin.

By JOEY LATIMER

One character you would not want to be on Halloween is a pumpkin. You'd first suffer the horrible ordeal of getting your insides scooped out and your eyes, nose and mouth carved. Then you'd be placed outdoors, helpless in the black night and chill wind and at the mercy of ghosts and goblins and other terrifying monsters who want to squash you.

So, instead of making a scary pumpkin, I made a *scared* pumpkin!

His eyes dart from side to side in frantic desperation, hoping against hope that *this* house will be overlooked by the trick or treaters.

Without warning, a sickly white flash lights up the night, followed by the sharp slap of thunder. And music! Where's that haunting music coming from! Another bright flash silhouettes a trick or treater gliding up the walk. The porch light pops on. No! It can't be! It's wearing an Ozzy Osborne outfit! Arrrggghhh!!!

Type in Listing 1, using *RUN*'s Checksum to catch any gremlins in typing, then save it. You can run it on a C-64 or a C-128 in 40-Column mode. If you use C-128 mode (the pumpkin looks quite different), you will see that certain lines refer you to Listing 2 for additional program lines.

Put your scared pumpkin in a window—safe from the wicked night outside—and hope the tricksters and goblins will be kind on this Halloween. R

Joey Latimer has extensive experience as a programmer on Commodore and other microcomputers. A former recording engineer, musician and teacher, he worked for several years on the staff of Family Computing Magazine, most recently as Technical Editor.

Listing 1. Pumpkin program.

```
10 REM HALLOWEEN PUMPKIN - J. L
   ATIMER                    :REM*132
40 DIM V1(44,3),V2(44,3)
                             :REM*152
50 S=54272:V=53248:R$=CHR$(18)
                             :REM*139
60 B$=R$+CHR$(149):P$=R$+CHR$(1
   29)                       :REM*201
70 S$=CHR$(32):Y$=R$+CHR$(158):
   NR$=CHR$(146)             :REM*249
80 IF PEEK(40960) THEN MO=64
                             :REM*205
90 FOR X=S TO S+23:POKE X,0:NEX
   T X                       :REM*26
100 POKE S+5,68:POKE S+6,238
                             :REM*228
110 POKE S+12,68:POKE S+13,238
                             :REM*95
120 FOR X=1 TO 38:P$=P$+S$:Y$=Y
   $+S$                      :REM*174
130 B$=B$+S$:SP$=SP$+S$:REM*201
140 NEXT X:B$=LEFT$(B$,3)
                             :REM*58
150 PRINT CHR$(147):POKE 53281,
   0:POKE 53280,0            :REM*235
160 FOR R=1 TO 24:READ C,NO:GOS
   UB 690                    :REM*44
170 IF MO=64 THEN PRINT LEFT$(P
   $,NO+2);                  :REM*14
180 NEXT R                   :REM*219
190 FOR X=1 TO 18:READ C,R,NO:G
   OSUB 690                  :REM*68
200 IF MO=64 THEN PRINT LEFT$(Y
   $,NO+2);                  :REM*141
210 NEXT X                   :REM*6
220 FOR R=1 TO 2:READ C,NO:GOSU
   B 690                     :REM*146
230 IF MO=64 THEN PRINT "{CTRL
   1}";LEFT$(SP$,NO);        :REM*205
240 NEXT R                   :REM*20
250 FOR R=0 TO 2:C=18:GOSUB 690
                             :REM*233
260 IF MO=64 THEN PRINT "{CTRL
   1}";B$;B$;B$              :REM*135
270 NEXT R                   :REM*54
280 IF MO=64 THEN PN=0:GOTO 330
                             :REM*82
290 FOR X=3584 TO 3775:READ D:P ►
```

RUN it right: **C-64; C-128 (in 40-Column mode)**

ILLUSTRATED BY REGAN DUNNICK

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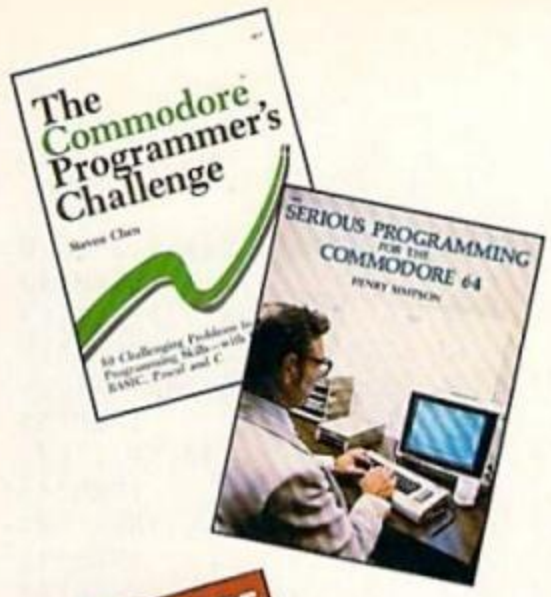

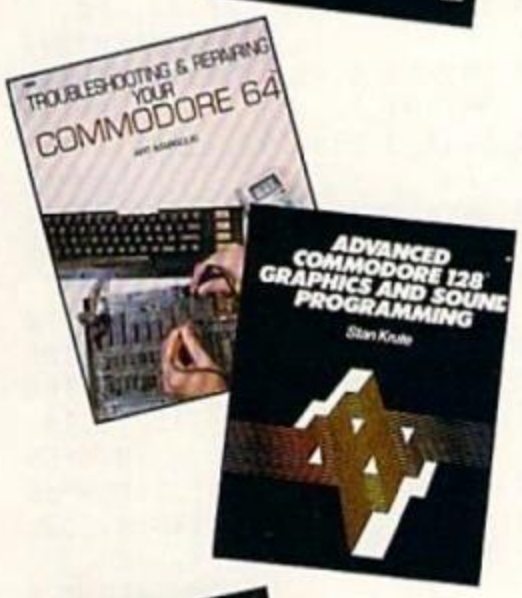

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```
    OKE X,D:NEXT X          :REM*44
300 IF MO<>64 THEN GOSUB 1290
                            :REM*151
310 REM:IF YOU'RE USING A C-128
    , SEE LISTING 2 FOR THIS LI
    NE'S CONTENTS           :REM*43
320 REM:IF YOU'RE USING A C-128
    , SEE LISTING 2 FOR THIS LI
    NE'S CONTENTS           :REM*37
330 FOR X=832 TO 1023:READ D:PO
    KE X,D:NEXT X           :REM*6
340 POKE V+37,1:POKE V+38,14:PO
    KE V+16,0               :REM*197
350 POKE V+39,0:POKE V+40,0:POK
    E V+41,0                :REM*106
360 POKE V+28,3:POKE V+29,0:POK
    E V+23,0                :REM*225
370 POKE V,94:POKE V+1,100:POKE
     V+2,238:POKE V+3,100
                            :REM*15
380 FOR X=1 TO 4:READ PT(X,1),P
    T(X,2):NEXT X           :REM*26
390 IF MO=64 THEN 410       :REM*98
400 REM:IF YOU'RE USING A C-128
    , SEE LISTING 2 FOR THIS LI
    NE'S CONTENTS           :REM*117
410 POKE 2040,PN+13:POKE 2041,P
    N+13                    :REM*191
420 POKE V+21,3 :POKE V+27,0
                            :REM*22
430 FOR X=1 TO 44:READ V1(X,1),
    V1(X,2),V1(X,3):NEXT X
                            :REM*3
440 FOR X=1 TO 44:READ V2(X,1),
    V2(X,2),V2(X,3):NEXT X
                            :REM*126
450 GOSUB 510:FOR X=1 TO RND(1)
    *5+5:GOSUB 470          :REM*166
460 FOR DE=1 TO RND(1)*1500+250
    :NEXT DE,X:GOTO 450     :REM*26
470 N=INT(RND(1)*4)+1       :REM*232
480 IF MO=64 THEN 500       :REM*219
490 REM:IF YOU'RE USING A C-128
    , SEE LISTING 2 FOR THIS LI
    NE'S CONTENTS           :REM*158
500 POKE 2040,PN+PT(N,1):POKE 2
    041,PN+PT(N,2):RETURN
                            :REM*252
510 POKE S+24,10            :REM*238
520 FOR X=1 TO 44:POKE S+4,33:P
    OKE S+11,33             :REM*127
530 POKE S+1,V1(X,1):POKE S,V1(
    X,2)                    :REM*130
540 POKE S+8,V2(X,1):POKE S+7,V
    2(X,2)                  :REM*148
550 FOR DE=1 TO (35-(PN/2))*V1(
    X,3):NEXT DE            :REM*37
560 IF RND(1)>.7 THEN GOSUB 470
                            :REM*228
570 POKE S+4,32:POKE S+11,32
                            :REM*130
580 NEXT X:POKE S+11,0:POKE 204
    0,PN+14:POKE 2041,PN+15
                            :REM*7
590 REM:IF YOU'RE USING A C-128
    , SEE LISTING 2 FOR THIS LI
    NE'S CONTENTS           :REM*50
600 POKE S+4,129:POKE S+24,15:P
    OKE S,104               :REM*2
610 FOR L=1 TO RND(1)*75+25:POK
    E S+1,RND(1)*9+2        :REM*14
620 POKE V+33,RND(1)*15:POKE V+
    32,RND(1)*15            :REM*35
630 POKE V+37,RND(1)*15+1:POKE
    V+38,RND(1)*15+1        :REM*207
640 NEXT L:POKE V+33,0:POKE V+3
    2,0:POKE V+37,1:POKE V+38,1
    4                       :REM*37
650 IF MO=64 THEN 670       :REM*169
660 REM:IF YOU'RE USING A C-128
    , SEE LISTING 2 FOR THIS LI
    NE'S CONTENTS           :REM*72
670 POKE 2040,PN+13:POKE 2041,P
    N+13                    :REM*162
680 POKE S+4,128:FOR DE=1 TO 20
    0:NEXT DE               :REM*89
690 IF MO=64 THEN 710       :REM*167
700 SYS 52332,,R,C:RETURN
                            :REM*85
710 POKE 781,R:POKE 782,C:POKE
    783,0                   :REM*231
720 SYS 65520:RETURN        :REM*96
730 REM --PUMKIN DATA       :REM*216
740 DATA 8,24,5,30,4,32,3,34,2,
    36,1,37                 :REM*196
750 DATA 1,38,1,38,1,38,1,38,1,
    38,1,38                 :REM*217
760 DATA 1,37,2,36,2,36,3,34
                            :REM*70
770 DATA 3,34,4,32,5,31,6,29
                            :REM*132
780 DATA 7,27,8,24,9,21,11,17
                            :REM*164
790 DATA 10,4,1,28,4,1,9,5,3,27
    ,5,3                    :REM*124
800 DATA 8,6,5,26,6,5,7,7,7,19,
    7,1,25,7,7              :REM*26
810 DATA 6,8,9,18,8,3,24,8,9
                            :REM*120
820 DATA 17,9,5,16,10,7,15,11,9
                            :REM*3
830 DATA 12,16,15,13,17,13,14,1
    8,11                    :REM*35
840 REM --SPRITE DATA       :REM*33
850 DATA 15,8,17,5          :REM*93
860 DATA ,,,,,,,            :REM*234
870 DATA ,,,,2,170,128,10
                            :REM*134
880 DATA ,160,40,,40,160,255,10
                            :REM*43
890 DATA 131,255,194,131,235,19
    4,131,235               :REM*111
900 DATA 194,131,235,194,131,25
    5,194,160               :REM*54
910 DATA 255,10,40,,40,10,,160
                            :REM*43
920 DATA 2,170,128,,,,,:REM*205
930 DATA ,,,,,,,            :REM*35
940 DATA ,,,,,,,            :REM*57
950 DATA ,,,,2,170,128,10
                            :REM*214
960 DATA ,160,40,,40,160,,252
                            :REM*153
970 DATA 128,3,255,128,3,235,12
    8,3                     :REM*156
980 DATA 235,128,3,235,128,3,25
    5,160                   :REM*222
990 DATA ,252,40,,40,10,,160
                            :REM*64
1000 DATA 2,170,128,,,,,:REM*62
1010 DATA ,,,,,,,           :REM*115
1020 DATA ,,,,,,,           :REM*137
1030 DATA ,,,,2,170,128,10
                            :REM*103
1040 DATA ,160,40,,40,63,,10
                            :REM*242
1050 DATA 255,192,2,235,192,2,2
    35,192                  :REM*114
1060 DATA 2,235,192,2,255,192,2
    ,63                     :REM*15
1070 DATA ,10,40,,40,10,,160
                            :REM*197
1080 DATA 2,170,128,,,,,
                            :REM*110
1090 DATA ,,,,,,,           :REM*195
1100 REM --EYE DATA         :REM*158
1110 DATA 13,13,14,14,15,15,13,
    13                      :REM*65
1120 REM --MUSIC DATA       :REM*86
1130 DATA 9,104,4,12,143,4,,,2,
    14,239,4,12,143,4,,,2
                            :REM*76
1140 DATA 9,104,4,12,143,4,,,2,
    14,239,4,12,143,4,,,2
                            :REM*181
1150 DATA 9,104,4,12,143,4,,,2,
    14,24,3,14,239,3        :REM*178
1160 DATA 14,24,3,12,143,3,11,2
    18,4,,,2,12,143,4,14,24,4,
    ,,2                     :REM*133
1170 DATA 9,104,4,12,143,4,,,2,
    14,239,4,12,143,4,,,2
                            :REM*151
1180 DATA 9,104,4,12,143,4,,,2,
    14,239,4,12,143,4,,,2
                            :REM*157
1190 DATA 9,104,4,12,143,3,18,2
    09,3,16,195,3           :REM*94
1200 DATA 14,239,3,14,24,3,11,2
    18,3,12,143,6           :REM*171
1210 DATA 12,143,4,14,239,4,,,2
    ,18,209,4,14,239,4,,,2
                            :REM*252
1220 DATA 12,143,4,14,239,4,,,2
    ,18,209,4,14,239,4,,,2
                            :REM*134
```

Even a scared pumpkin can frighten trick or treaters!

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```
123Ø DATA 12,143,4,14,239,4,,,2
     ,16,195,3,18,2Ø9,3:REM*191
124Ø DATA 16,195,3,14,239,3,14,
     24,4,,,2,14,239,4,16,195,4
     ,,,2                  :REM*1
125Ø DATA 12,143,4,14,239,4,,,2
     ,18,2Ø9,4,14,239,4,,,2
                           :REM*164
126Ø DATA 12,143,4,14,239,4,,,2
     ,18,2Ø9,4,14,239,4,,,2
                           :REM*174
127Ø DATA 12,143,4,14,239,3,25,
     3Ø,3,22,96,3          :REM*99
128Ø DATA 18,2Ø9,3,16,195,3,14,
     24,3,14,239,6         :REM*246
129Ø REM:IF YOU'RE USING A C-12
     8, SEE LISTING 2 FOR LINES
      129Ø-15ØØ            :REM*23Ø
```

Listing 2. Additional C-128 40-Column mode program lines.

```
31Ø PN=43:SPRITE 1,1,1,Ø,Ø,Ø,1:
    SPRITE 2,1,1,Ø,Ø,Ø,1:POKE V
    +38,14                 :REM*33
32Ø MOVSPR 1,134,1Ø7:MOVSPR 2,2
    14,1Ø7:GOTO 38Ø        :REM*1
4ØØ SPRSAV SP$(1),1:SPRSAV SP$(
    1),2:GOTO 42Ø          :REM*3Ø
49Ø SPRSAV SP$(PT(N,1)-12),1:SP
    RSAV SP$(PT(N,1)-12),2:RETU
    RN                     :REM*132
59Ø IF MO<>64 THEN SPRSAV SP$(2
    ),1:SPRSAV SP$(3),2:REM*122
66Ø SPRSAV SP$(1),1:SPRSAV SP$(
    1),2:GOTO 68Ø          :REM*74
129Ø COLOR Ø,1:COLOR 4,1:COLOR
     2,9                   :REM*171
13ØØ COLOR 1,1Ø:COLOR 3,8:GRAPH
     IC3,1:SCNCLR:FAST     :REM*99
131Ø FOR X=5 TO 65 STEP 1Ø
                           :REM*29
132Ø CIRCLE 1,8Ø,1ØØ,X,9Ø,Ø,18Ø
     ,Ø,1                  :REM*185
133Ø CIRCLE1,8Ø,1ØØ,X,9Ø,18Ø,36
     Ø,Ø,1:NEXT            :REM*86
134Ø FOR X=2Ø TO 14Ø STEP 1Ø:PA
     INT 2,X,1ØØ,1:NEXT:REM*116
135Ø DRAW 3,6Ø,57 TO 7Ø,73 TO 5
     Ø,73 TO 6Ø,57         :REM*96
136Ø DRAW 3,1ØØ,57 TO 11Ø,73 TO
      9Ø,73 TO 1ØØ,57      :REM*89
137Ø DRAW 3,8Ø,82 TO 9Ø,98 TO 7
     Ø,98 TO 8Ø,82         :REM*59
138Ø PAINT 3,6Ø,7Ø,Ø:PAINT 3,1Ø
     Ø,7Ø,Ø:PAINT 3,8Ø,85,Ø
                           :REM*249
139Ø CIRCLE 3,8Ø,15Ø,5Ø,1Ø,27Ø,
     45Ø:CIRCLE 3,8Ø,135,5Ø,1Ø,
     29Ø,43Ø               :REM*8Ø
14ØØ DRAW 3,33,131 TO 3Ø,15Ø:DR
     AW 3,127,132 TO 13Ø,15Ø:PA
     INT3,8Ø,135,Ø         :REM*97
141Ø FOR I=1 TO 4:SPRSAV I,SP$(
     I):NEXT               :REM*18
142Ø MOVSPR 1,134,1Ø7:MOVSPR 2,
     214,1Ø7               :REM*2Ø3
143Ø SPRSAV SP$(1),1:SPRSAV SP$
     (1),2                 :REM*99
144Ø COLOR 3,6:CIRCLE 3,8Ø,1Ø,5
     ,1Ø,225,36Ø:CIRCLE 3,9Ø,1Ø
     ,5,1Ø,225,36Ø         :REM*28
145Ø DRAW 3,8Ø,Ø TO 89,Ø:DRAW 3
     ,76,17 TO 85,17:PAINT 3,8Ø
     ,12,Ø                 :REM*1Ø8
146Ø FOR X=4Ø TO 112 STEP 8
                           :REM*42
147Ø DRAW Ø,X,128 TO X+4,139 TO
      X+8,128:NEXT         :REM*13Ø
148Ø DRAW Ø,4Ø,128 TO 6Ø,122:DR
     AW Ø,12Ø,128 TO 1ØØ,122:DR
     AW Ø,6Ø,122 TO 1ØØ,122
                           :REM*14
149Ø PAINT Ø,5Ø,13Ø,Ø      :REM*218
15ØØ SLOW:RETURN           :REM*6 ■
```


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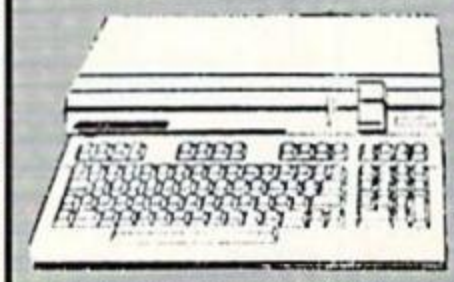

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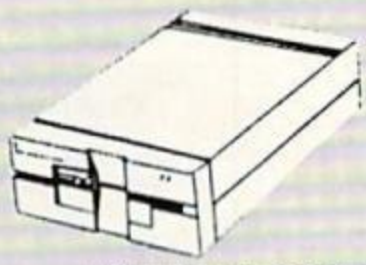

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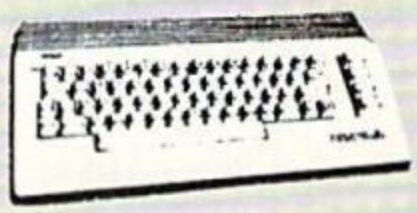

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Tool for Teachers

Use this test-score analysis to help spot students' weaknesses.

By RICK KEPHART

Teachers who are Commodore owners will appreciate this Z-Scores program (Listing 1). It statistically analyzes test scores to produce a z-score for each student and then a more easily used "curved" grade derived from the z-score. It also generates a rank-ordered listing of the raw scores (the scores entered).

Z-scores are based on the standard deviation from the mean of the raw scores. Therefore, they normally remain quite constant from test to test, regardless of the difficulty of the test. When a student's z-scores are consistently lower than those of most other students taking the same tests, he or she probably needs special help. Similarly, if a particular student's z-scores suddenly drop, he or she may be encountering a momentary difficulty that requires attention.

Z-scores can indicate problems with a test, as well. If many of the z-scores for the test are inconsistent with the students' past records, the test design may have been faulty, or the students may have been guessing too much, or even cheating.

A z-score of 0 is average. Positive z-scores are above average, and negative scores are below average. To make the z-scores more meaningful, the program plots them on a standard bell curve, then translates them into letter grades. The letter grades have the following meanings: A, far above average; B, above average; C, average; D, below average; F, far below average. The program also displays the average of the raw scores.

You have a choice of an on-screen display or a printout. I recommend a printout, especially when you have more than ten students taking a test. Both outputs consist of four columns—name, rank ordering of the raw scores,

curved letter grades and z-scores—with the average of the raw scores below.

Lines are skipped in the display or printout, except when identical raw scores have been earned. This makes the statistical mode—the most frequent score—in the rank ordering more apparent. If there's more than one mode—that is, it more than one score appears at this greatest frequency—there may be a need for separate grouping.

In addition to your choice of screen display or printout, you have the option of using a sequential disk file for inputting students' names. This file is created by the program in Listing 2. Having the names on disk saves retyping them each time you run Z-Scores. However, you can't use file input if you don't have a score for every name in the file.

When entering names and scores into the program, you can correct mistakes by typing – 1 at the next prompt. Pressing the return key without entering a name indicates that you're done with the names; pressing return while entering scores repeats a score.

Note that only the first 15 letters of a name will appear in the screen display or printout. Also, scores must represent the number or percentage correct, not those wrong; no score can be less than zero or more than 127; and only whole numbers are allowed. Finally, when typing in the listings, be sure to use *RUN*'s Checksum program to detect input errors. R

Rick Kephart is a teacher and a Commodore SIG leader for DEL-CHUG, a multiuser's group in his area.

Listing 1. Z-Scores program.

```
Ø REM Z-SCORES                :REM*157
1Ø PRINT CHR$(147):PRINT TAB(1Ø
   ) "Z-SCORE CALCULATOR":PRINT
                              :REM*226
2Ø FOR I=828 TO 874:READ X:Y=Y+
   X:POKE I,X:NEXT            :REM*143
3Ø IF Y<>7342 THEN PRINT "ERROR
    IN DATA":END              :REM*22
4Ø DIM NA$(255),SC(255),DV(255)
   ,ZS(255)                   :REM*23
5Ø S$="{2Ø SPACEs}"           :REM*215
6Ø INPUT "OUTPUT TO PRINTER";D$
   :D=3:IF LEFT$(D$,1)="Y" THEN
    D=4                       :REM*17Ø
7Ø PRINT:INPUT "FILENAME";F$:IF
    F$="" THEN11Ø             :REM*23Ø
8Ø OPEN 8,8,8,F$:OPEN15,8,15
                              :REM*63
9Ø INPUT#15,A,B$:IF A THEN PRIN
   T B$:CLOSE 8:CLOSE 15:F$="":►
```

RUN it right: **C-64; printer recommended**

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```
   GOTO7Ø                    :REM*122
1ØØ INPUT#8,X:FOR I=1 TO X:INPU
    T#8,NA$(I):NEXT:CLOSE 8:CLO
    SE 15                    :REM*233
11Ø N=N+1:IF F$="" THEN PRINT "
    NAME"N;:INPUT NA$(N):REM*46
12Ø IF NA$(N)="" THEN19Ø
                             :REM*22Ø
13Ø IF NA$(N)="-1" THEN NA$(N)=
    "":N=N-2:GOTO11Ø         :REM*23
14Ø NA$(N)=RIGHT$(S$+NA$(N),15)
                             :REM*26
15Ø PRINT NA$(N)+"'S SCORE";:IN
    PUT SC$:SC(N)=VAL(SC$)
                             :REM*95
16Ø IF SC(N)<Ø THEN N=N-1:GOTO1
    5Ø                       :REM*112
17Ø IF SC(N)>127 THEN15Ø
                             :REM*2Ø7
18Ø POKE 49151+N,SC(N):GOTO11Ø
                             :REM*1Ø9
19Ø S$=RIGHT$(S$,4)          :REM*24
2ØØ N=N-1:POKE 254,N:POKE 253,N
    :SYS 828:FOR I=1 TO N:SU=SU
    +SC(I):NEXT              :REM*57
21Ø ME=INT(SU/N+.5)          :REM*213
22Ø FOR I=1 TO N:DV(I)=SC(I)-ME
    :SM=SM+(DV(I)*DV(I)):NEXT
                             :REM*54
23Ø SD=SQR(SM/N)             :REM*65
24Ø OPEN 4,D                 :REM*136
25Ø FOR J=1 TO N:SP=SC(I):I=PEE
    K(494Ø8+J)               :REM*1Ø2
26Ø IF SC(I)<>SP THEN PRINT#4
                             :REM*77
27Ø ZS(I)=INT(((DV(I)/SD)+.ØØ5)
    *1ØØ)/1ØØ                :REM*57
28Ø GR=1-(ZS(I)>-1.5)-(ZS(I)>-.
    5)-(ZS(I)>.5)-(ZS(I)>1.5)
                             :REM*21Ø
29Ø SC$=RIGHT$(S$+STR$(SC(I)),5
    )                        :REM*43
3ØØ PRINT#4,NA$(I);SC$;S$;MID$(
    "FDCBA",GR,1);S$;ZS(I)
                             :REM*82
31Ø NEXT                     :REM*185
32Ø PRINT#4:PRINT#4,"AVERAGE ="
    ME                       :REM*7Ø
33Ø CLOSE 4                  :REM*8Ø
34Ø DATA 16Ø,255,2ØØ,152,17Ø,18
    5,Ø,192,48,248,232,228,254,
    176,11,221,Ø,192         :REM*193
35Ø DATA 144,246,2Ø2,138,168,76
    ,62,3,166,253,2ØØ,152,157,Ø
                             :REM*2Ø2
36Ø DATA 134,253,136,169,255,15
    3,Ø,192,2Ø8,21Ø,96       :REM*24
```

Listing 2. File program.

```
Ø REM Z-SCORES LISTING 2 :REM*9
1Ø DIM N$(255):FOR I=1 TO 255
                             :REM*22Ø
2Ø PRINT "NAME #";I;:INPUT N$(I
   )                         :REM*17
3Ø IF N$(I)="" THEN 6Ø :REM*25Ø
4Ø IF N$(I)="-1" THEN I=I-2:NEX
   T                         :REM*173
5Ø NEXT                      :REM*18Ø
6Ø INPUT "FILENAME";F$:OPEN 8,8
   ,8,F$+",S,W":OPEN 15,8,15
                             :REM*133
7Ø INPUT#15,A,B$:IF A THEN PRIN
   T B$:CLOSE 8:CLOSE 15:GOTO 6
   Ø                         :REM*96
8Ø PRINT#8,I-1               :REM*122
9Ø FOR J=1 TO I-1            :REM*1Ø3
1ØØ PRINT#8,N$(J)            :REM*18
11Ø NEXT:CLOSE 8             :REM*32
```


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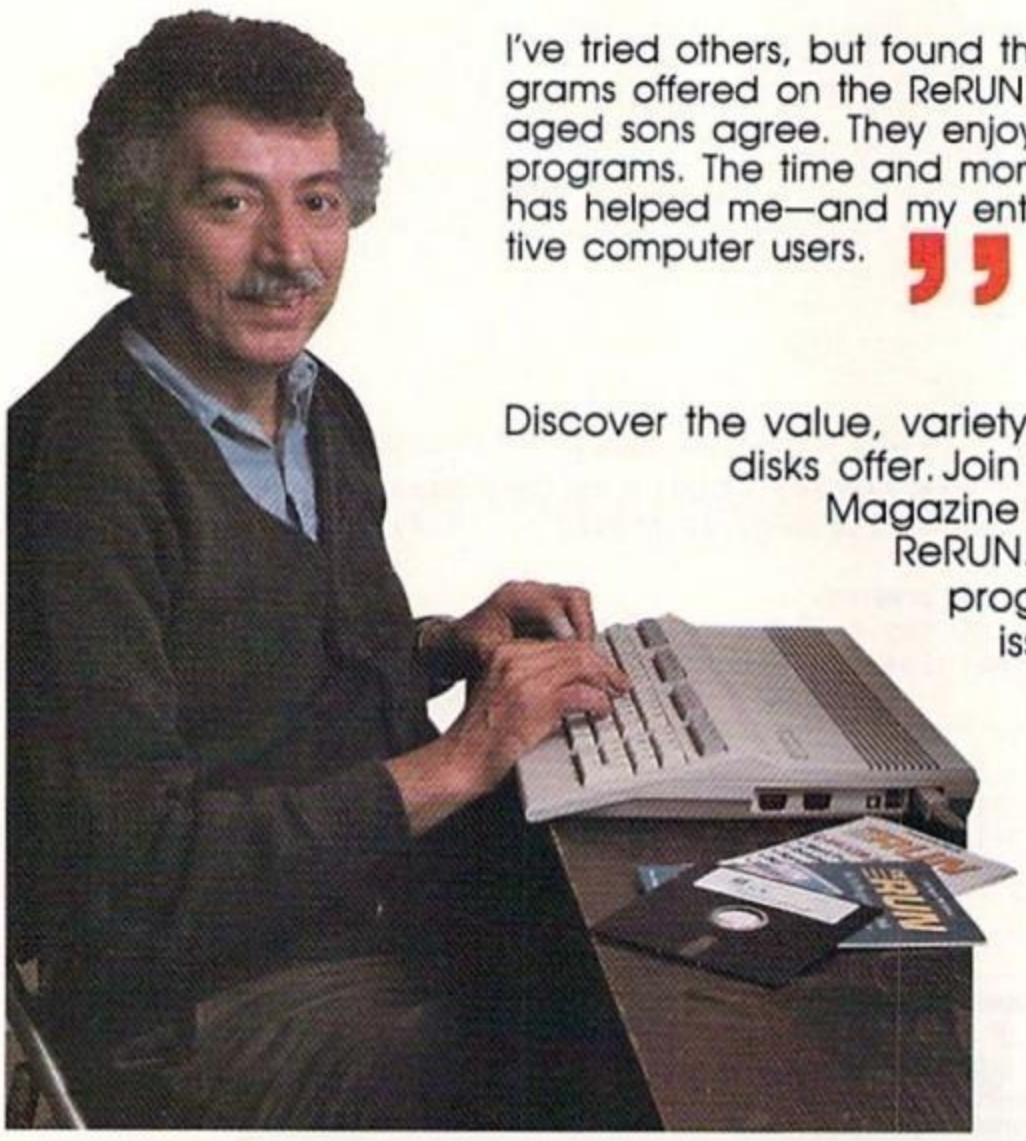

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TELECOMPUTING WORKSHOP

Confused by the multitude of terminal software? Here are some specifics to look for.

By LOREN LOVHAUG

RECENTLY, I CONDUCTED a seminar at a Commodore show. One of the participants had two queries: "What telecommunications question are you most often asked, and what telecommunications question do you find hardest to answer?"

After some thought, I realized that the reply to both is the same. The most frequent and most difficult telecommunications inquiry I encounter does not deal with the intricate details of baud rates, file-transfer protocols, handshaking or stop bits. Instead, I'm asked, "What telecommunications (terminal) software do you *recommend*?"

This probably seems like an innocent, non-technical question. However, there are literally hundreds of quality public domain and commercial terminal packages available for the C-64 and C-128, with more being added or upgraded every day. The terminal software that's best for you is a matter of personal preference and specific need. So, in the most hallowed tradition of American politics, I generally side-step the issue when queried as I was above. Instead of making specific recommendations, I like to discuss some of the features that I think are "must haves" in a good terminal program, and why.

MODEM SUPPORT AND USER FRIENDLINESS

The first thing to look for in terminal software is modem support. Your terminal package should let you accurately telecommunicate at your modem's top speed. Most C-64/C-128 terminal programs will have no problem at speeds of 1200 baud, and the better ones render error-free communications at 2400 baud as well.

Almost all terminal packages and modems support the industry-standard Hayes command set. However, if you own an older modem or one that is not Hayes-compatible, you'll have to look for a program that works with your setup.

Another basic characteristic of a good terminal package is a user-friendly interface. You might not think that the way the software's menus or command structures are designed is crucial, but it's probably one of the most important factors to consider.

The goal of terminal software is to provide fast and competent computer-to-computer communications, while giving you as much power and control over the process as possible. If you're currently using a terminal program that's difficult or cumbersome, it's neither efficient nor powerful. When the majority of your online sessions are spent with your eyes glued to the program's documentation rather than the screen, you're probably not telecommunicating very effectively.

Look for terminal software that can be operated intuitively. If a program is menu driven, ask yourself some questions. Are the menus organized in such a way that you can quickly select the options you need? Are submenus organized as part of a logical hierarchy, so that suboptions can be located without having to guess which menus they fall under?

If the software is command- or keyboard-driven, look for key sequences that are mnemonic in nature, and therefore easier to learn and remember. For instance, control/U is a good mnemonic keyboard sequence for uploading because the U key is easily associated with that purpose.

Status indicators are another important user-interface consideration. A good terminal package relates important operating information to the user, without being a nuisance. Feedback like communications settings, up- and download status, buffer space remaining, and so on, should be easy to obtain without disrupting exchanges or cluttering valuable screen space.

FILE-TRANSFER PROTOCOLS

A crucial terminal program design element involves file-transfer protocols. These are "conversation" rules or standards that ensure accurate transmission between two computers sending and receiving data.

To better understand how protocols work, consider the following from an imaginary computer conversation:

Computer A: I like you. 3 words.
Computer B: Sorry I only heard 2 words. Please repeat your message.
Computer A: I like you. 3 words.
Computer B: 3 words received. Please continue.

In this example, computer A attempts to send computer B a message. After transmitting, computer A informs computer B that the correct message consisted of three words. Unfortunately, computer B only received two words, so it asks for the message to be repeated. In a similar fashion, file-transfer protocols constantly monitor the accuracy of the data being transmitted, and ask the transmitting computer to repeat portions when circumstances indicate that an error has occurred.

Over the years, dozens of file-transfer protocols have been developed, but the two most popular in the Commodore world are the Punter and the Xmodem. Punter protocol is used only by bulletin board systems that are run on Commodore 8-bit computers, while Xmodem is a universal protocol, compatible with almost every type of computer. Both protocols accomplish the same task, but use different rules for data transfer and error detection. Because these two protocols have gained such widespread acceptance within the Commodore community, you should look for a terminal program that, at the very least, supports *both* Punter and Xmodem.

CAPTURE BUFFERS

Although file-transfer protocols facilitate the accurate transmission and reception of large amounts of data, they're not always the most convenient method for doing so. You should also look for a "capture" or "text" buffering capability when researching terminal software. Capture buffers let you record and store text data "on the fly"—directly as it comes in from your modem. This feature is particularly suited for storing text like electronic mail or public messages and announcements that you want to review at a later time. ►

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Capture buffers vary in size from program to program. On the 64, the size of a typical capture buffer is 20K, whereas on the 128, most are in excess of 45K. Twenty kilobytes is usually large enough, but there are times, especially if you frequent national telecommunications networks, when even a 60K buffer won't fit the bill. This is when it's important to have a terminal package that can "dump" the contents of the capture buffer to printer or disk.

Conversely, another very useful capture buffer feature is the ability to load text from disk to the buffer and transmit it via modem. You can save a lot of time and, in the case of national networks, money, by composing long messages off-line, loading them into the capture buffer and then having the buffer send them out through the modem. Some terminal software packages even have built-in text editors expressly for this purpose.

The Age of Automation

Most quality terminal programs have automatic dialers that not only let you store the phone numbers of your favorite BBSs and networks, but will also continuously dial them until you're connected. The best of these autodialers let you create sequences of phone numbers that are automatically and continuously dialed in turn until you get a connection. These features are particularly important in urban areas where you're more likely to encounter busy signals when trying to connect with a popular local BBS.

The most sophisticated terminal packages available for the C-64 and C-128 allow even further automation of your telecommunications sessions. Some display keyboard macros, in which text or entire command sequences can be stored and later recalled at the touch of a key. Basic macro facilities simply let you assign text to your function keys, which can be useful for the storage of passwords or other frequently typed words.

Some terminal programs even have script languages for complete automation of log-on procedures, text buffering, uploads and downloads and remote hosting. In fact, some of these languages are so sophisticated that they can program your terminal package to automatically call a certain bulletin board or network at a prescribed time, buffer new public messages and electronic mail for later off-line viewing, post prewritten messages and log-off—all while you're away from the computer.

That's a brief overview of what I feel are important aspects of quality terminal software. In a future column, I'll size up many of the most popular public domain and commercial terminal packages against the criteria I outlined above. I hope you found this column helpful in your search for the "ultimate" terminal program. ■

Loren Lovhaug is a programmer and writer with a lot of telecommunications experience. You can write to him care of:

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GEOWATCH

Find out how you can streamline your geoProgramming sessions.

By WILLIAM COLEMAN

THERE IS NO QUESTION that GEOS has revolutionized the use of the C-64 and C-128. Until recently, however, GEOS suffered from one major disadvantage: programming under it was difficult, since its unique disk structures necessitated the use of special programs to modify the machine code so it would run properly.

GeoProgrammer has changed that. It's now much easier to write source code that compiles into true GEOS files. Since most Commodore programmers aren't accustomed to intermediate (linker) files or to using geoWrite files to create source code, I'll discuss some of the finer points of geoAssembler and geoLinker. This won't be a crash course in ML programming, but you do need some familiarity with programming technology. My main emphasis will be on style and efficiency in creating geoProgrammer files.

GEOWRITE SOURCE CODE FILES

I admit it: I had misgivings about the fact that all source code files must be in geoWrite format. But I quickly learned that it's really not a problem. GeoAssembler and geoLinker will accept *all* versions of geoWrite files through V2.1. (If possible, try to keep all your source files in the same version; mixing versions is allowed, but it can cause confusion when you try to read error files.)

There are several techniques you can employ to make working with geoWrite files easier. The first, and probably the most important, is to place page breaks at frequent intervals throughout your code. If you don't, geoWrite will have to reformat every time you try to move from one page to another. And, even with a RAM expansion unit (REU), things will slow down considerably if, for example, geoWrite has to reformat ten pages of source code because you inserted three lines of text.

Leave plenty of "white space" within the text area when you are initially designing an application; don't put data on more than about half the page. If you're creating a set of routines that you know will later be expanded upon, don't be afraid to leave a page or two blank (and remember to put a comment to that effect on the top of each page). This will let you insert additions at another time, without increasing the number of pages.

Put the application's name, author, date and so forth on page 1, and include a table of contents that lists the subroutines contained on each page of the file. In this way, you'll be able to quickly locate a subroutine. It may seem like a lot of trouble, but six months later, when you need to correct a bug, you'll be glad you took the time!

Type style and indentation are also important. Choose tab stops for labels, opcodes and comments, and then adhere to them throughout your applications. My personal preference is to place labels, on a line by themselves, in BSW 9-point boldface and the remainder of the source code in BSW 9-point plain. Whatever format you use, remember to be consistent throughout all your files. Font changes don't make things any easier, and they slow down the assembler.

Try not to let subroutines take up more than a single page. While this is not always possible, it helps to follow the flow of logic and makes the code easier to read. If you must split up a subroutine, place a comment line at the top of the second and subsequent pages indicating that the routine begins on a previous page. If you notice that a subroutine is getting too long, try to split it up into several smaller ones. You'll often find generic routines embedded in the subroutine that you can use again in another section of the application.

While geoWrite files of any size will work, larger files—over 15 pages—become cumbersome to maintain and debug. Try to separate your code into several files of related functions—menus and icon data, display handlers, tables, dialog boxes, and so on. The only possible exception to this is when the entire application is less than approximately 20 geoWrite pages; in that case, you can use a single file.

I've found that a handy time-saver is to keep readily available files of generic routines that can be used in virtually any program. For example, I have files that contain routines to clear the screen, drive fileboxes, make beeps, build icon tables, and so forth. These routines are all self-contained, so when I need one, all I do is link it into the application. This saves me from having to reinvent the wheel every time I design a new application.

INCLUDE FILES

One of the biggest mistakes people make when using Include files is that they try to "include" source code. This is a bad practice for several reasons. Any bugs in the included file will not be flagged—all you'll get is a "hidden error" message. Also, you'll have to completely recompile the included file every time you compile the main file, and this wastes time. A much better solution is to compile each file separately and then let the Linker combine them.

You should use Include files only for constants, equates and macros. In fact, I carry this rule one step further: any source files in any application I write have only one .include statement at the beginning of the file. The .include statements for geosSym, geosMac, and so on, are contained at the beginning of my application's Include file. This type of nesting is perfectly acceptable and works like a charm. Just make sure that the .IF Pass1... etc. sequence that normally surrounds an .include statement is only in a source file; any nested .includes should be by themselves.

VLIR files are a minor exception. Each group of files that makes up a single module can have a second Include file that contains the equates or constants that pertain only to that particular module.

Unfortunately, there's one major exception. The current version of geoLinker has a ten-file limit per module, so you may need to use .include source files to get around this if you're writing a long application. The only other solutions are to make the source files larger to keep the total under ten, or ►

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to use a VLIR structure and have the root module load all the others when the application is first loaded. All of these solutions are kludges to a nasty problem. Supposedly, version 2.0 will correct this deficiency, but only time will tell.

Disk Drive Management

If you're lucky enough to own two disk drives, the best way to arrange your files is to have all the system files—geoAssembler, geoLinker, geoWrite and so forth—on one disk, and all of the source files, including the .rel and .lnk files, on the other. If you have a single drive and an REU, then load all of the system files into the REU and assemble/link to the disk.

Single drive users have more of a problem, because you won't be able to get all the files on a single disk unless the application you're writing is extremely small. The best method I've found is to have a "linker" disk that contains geoLinker, geoDebugger, geoWrite, the .rel files, and the .lnk file, and one "assembler" disk that contains geoAssembler, geoWrite, and all of the source and Include files. Whenever you assemble a file or files, you can then copy them to the linker disk for linking. Admittedly, this is a bit awkward, but it works better than any of the alternatives I've tried to date. For really large applications, you might need to use more than one assembler disk.

Another problem single drive users will encounter is the inability to generate a viewable symbol table while linking files. The dialog box that contains this option is only available to dual-drive systems. This oversight should be corrected in the next version of geoLinker.

The .End Command

The .End command is used to stop the assembly of a current file. While you won't normally need this function, certain situations warrant its use. For example, when placed in an Include file, it causes the remainder of the file to be ignored without aborting the assembly of the parent file. I use .end in BSW's Macro file to prevent the assembly of the bit-manipulation macros located at the end of the file. This process leaves room for more of my own macros. If I need to retrieve the old macros, all I have to do is remove the .End statement.

This feature also comes in handy for testing or debugging routines. Simply place them at the end of a source file and insert or remove an .End statement as needed to activate the routines.

In Conclusion

No matter what methods or techniques you decide to use, do be consistent in all of your applications. Continuity in style and procedure makes it easier to debug and maintain your work months after it is "finished." ■

GEOS programming expert Bill Coleman is the GEOS SYSOP for GEnie online service.

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COMMODORE CLINIC

Want to add nine voices to your C-64? Looking for programs that operate on the 1581 drive? Need to hide your directories from prying eyes? Commodore Clinic has the answers!

By LOU WALLACE

HARDWARE

Q *I need a way to add additional voices to my C-64, beyond the three already built in. I thought I saw an ad for a product that does this, but I can't recall the name. Can you help?*

—DON FERGUSON
ST. MARYS, OH

A The C-64 and C-128 normally have only three sound voices, created by the SID chip. It will take a hardware addition and software designed to use the added hardware to increase the number of voices.

One way to add voices is via an external device. One such product advertised in *RUN* is the SFX Sound Expander. This device adds nine voices to the C-64 through digital synthesis and can be equipped with a keyboard. You can get information on it by writing to Fearn & Music, 519 W. Taylor #114, Santa Maria, CA 93454; 800-447-3434.

Another way is to add a SID chip to your 64. This gives you a total of six voices, in stereo (three per channel). However, it involves modifications to the computer, and would of course void your warranty. And if it's not installed properly by a skilled technician, it could even destroy your computer. Information for adding the second SID can be downloaded from QuantumLink's CIN MUSIC area. The file to download can be found in the SID Utilities area of the Music Room and can be directly downloaded by referring to its file number, 799745. You'll find quite a bit of software support there for this modification, including music files and music editing utilities.

Q *I understand that some RAM expander cartridges, such as the 1750 and 1764, come with (and require) a more powerful power supply than the original that came with the Commodore. Is this true, and if so where do you get these power supplies?*

—SHIBU KINATUKARA
YONKERS, NY

A Only the 1764 (when used with the C-64) requires a new power supply. One already comes with the 1764 cartridge when you buy it. As for the C-128, its power supply is good enough to handle RAM expansion. No other is needed to use the 1700 or 1750 on the C-128.

Q *I'm one of the few people who still has some programs on cassette tapes. And they take so-o-o long to load! I'd like to transfer them to my disk drive, but many of the files are binary and cannot just be loaded and saved to a disk. Is there a copy program that copies from a tape to a disk?*

—RAY TOWER
BYRON, MI

A Since at one time there were many C-64 users with tape systems, you'd think that such a program would have been written, but I have to admit I've never seen one. Perhaps a reader knows of one and can either send it in or tell us where to get it. If he does, I'll publish the information in the Update section of Commodore Clinic.

Q *I have both the SFD-1001 and 1541 disk drives. The SFD drive is interfaced to the computer with the Skyles IEEE Flash 64 interface. My problem is finding a copy program that will let me copy programs from the 1541 to the 1001. Are there any commercial or public domain programs that do this?*

—DOUGLAS BREDA
PETERBOROUGH, NH

A Commodore guru Jim Butterfield wrote a popular program called Copy/All 64 that will work just fine. It's available from just about every user group library, local BBS or national telecommunications network around. It's also on the 1541 Test Demo disk that came with your 1541.

But if you need to copy entire disks, using a track and sector-type copier won't work. In order to get the larger capacity of the 1001 drive, it has to use a different disk format, one that's unfortunately incompatible with the 1541. So, whole disk backups are not possible. But, as mentioned, you can copy a disk one file at a time.

Other problems will arise when you try to run some software from the SFD-1001. Anything that uses the 1541 disk ROMs for faster loading or copy protection will not work correctly on the 1001. And some software may be incompatible with your IEEE interface and not run properly.

SOFTWARE

Q *Is there* any *C-64 or C-128 software available in 1581 format? I have the 1581 drive and nothing to put in it!*

—GEORGE BLOOM
NEW YORK, NY

A Yes, there is. One is Super 81 Utilities ($39.95) by Free Spirit Software (905 West Hillgrove, Suite 6, LaGrange, IL 60525; 312-352-7323). It's available in both C-64 and C-128 modes. Another group of 1581 format programs is available from Abacus Software (5370 52nd St. SE, Grand Rapids, MI 49508; 616-698-0330). They have six titles available in 1581 format. These are: Super C-64 Compiler, Super C-128, Basic 128 Compiler, Chartpak 128, Cobol 128 and Cadpak 128. You can only get these unprotected disks by ordering them as backup copies to the original disks.

PROGRAMMING

Q *I've written a C-64 game for a friend of mine, and the disk directory contains a lot of files I'd like to keep secret from him. Is there any way to hide the directory from prying eyes?*

—RENLY DUTTON
THOUSAND OAKS, CA

A I had to look around quite a bit before coming up with a solution. ►

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COMMODORE CLINIC

I was just about to give up when I came across this snip of a program (see below) in a Data Becker book called *Tricks & Tips for the C-128*, which is published by Abacus Software. When you type in and run the program, it erases the program file, "$", so when you try to load and list it, you won't get any directory.

A couple of words of warning are in order, however. First, this only works for loading "$", and not with the Directory command. Second, don't do this to any disk that you haven't made a backup of, since what you have done is corrupt the disk directory file, and you could end up losing valuable data or programs. And third, if you are going to do it, prepare the disk first with everything on it you need, then erase the "$" file.

```
10 REM ERASE A DISK $ DIRECTORY
   FILE
20 REM FROM THE BOOK TRICKS & TIPS
   FOR THE C128
30 OPEN 1,8,3,"#"
40 OPEN 2,8,15,"B-P3,144"
50 PRINT#1,CHR$(20)CHR$(20)CHR$(20)
   CHR$(0)CHR$(0)CHR$(0)
60 PRINT#2,"U2:3,0,18"
70 PRINT#2,"I"
80 CLOSE2:CLOSE1
90 END
```

Q *I've been trying to join together two C-128 programs by using the command Concat "Part2" to "Part1". I've also renumbered the programs so they don't have overlapping line numbers. The problem is the C-128 keeps giving me a File Type Mismatch Error message. What am I doing wrong?*

—JAY GREEN
PAHOKEE, FL

A The C-128 is already telling you what is wrong with its error message. The error message means you've told your computer to merge two *program* files, yet Concat is used only for *data* files. To join programs together, you'll need some sort of append utility program, of which there are many. Check your local user's group library or BBS—you may find one there.

Q *Help! I've been waiting in vain for any RUN Amok corrections to RUN Term 128 (January 1988). Since none has appeared, I must assume the listing was correctly published. I've checked and rechecked my listings, but whenever I run the RUN Term 128 Boot program, I get an Undefined Statement Error in 20 message. What am I doing wrong?*

—RICHARD WEST
SPRING VALLEY, CA

A There were no errors in the listing, so I have to think that you've made an error in typing it in. Hopefully, you used the Checksum program to catch most of your errors. However, it won't detect missing lines, which would definitely cause problems, so make sure you haven't skipped any.

Another potential problem is that you didn't create the proper binary files first. Listings 2–5 are not the actual programs; they are used to *create* the binary files. Make sure you've named each of those listings with names like Listing 2, Listing 3, and so on. Then run each one in order, and they'll write to your disk the real RUN Term files needed by the Boot program. Then run the Boot program.

If that fails, you could order the January-February 1988 ReRUN disk, which contains the actual program all ready to run. And for those of you interested, the new RUN Works disk contains an enhanced version of RUN Term, both C-64 and C-128 versions, that has a lot of new features like support for RAM expanders, multiple drives, and so forth.

Q *I'm trying to program sprites from Basic on my C-64, and I'm having problems getting more than one sprite to come on at a time. Assuming the variable V (for VIC II) is equal to 53248, and S is the sprite I want to turn on (0–7), I can then turn on any sprites I want by issuing POKE V+21,2^S. But when I try calling up a second sprite, the first one turns off.*

The line I use to turn them on is: POKE V+21,2^10:POKE V+21,2^11. This should turn on sprites 0 and 1, but instead, sprite 0 comes on for a second, turns off and then sprite 1 is on. What's going on?

—SHAWN ZOOWSKI
CLEVELAND, OH

A The problem is created by your use of two Pokes instead of one. V+21 is the Sprite Display Enable register, and each of the eight bits in that register determines if a sprite is on or off. If the bit equals 1, the sprite is on; if it equals 0, the sprite is off. So poking 2^10 turns on sprite 0, 2^11 turns on sprite 1, 2^13 sprite 2, and so on. But by poking in each value one at a time, you turn off all the preceding values. Using POKE V+21,2^10+2^11 will allow you to turn on two sprites at once.

The flip side of the problem is how to turn off one sprite without turning off the others, which can be difficult if you don't know what others are on. Again, we can use the Poke statement,

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but this time we combine it with a Peek command. To turn off a sprite S with a value of 0–7, you'd enter POKE V+21,(PEEK(V+21) AND (255–2↑S)) in your program.

Take a look at what this rather cryptic line does. First, it uses the Peek command to get the contents of memory address (V+21). Then it performs the Boolean function AND on that value, using the expression (255–2↑S) as its argument. If S=0, then 255–2↑S=254. ANDing the value found at V+21 with 254 turns off bit 0 if it's on, and leaves it unaltered if it's off. Finally, this new number is poked back into memory location V+21. In general, we can use the above procedure to selectively turn off any bit in a byte.

The earlier example above for turning on two sprites at once is fine as far as it goes. But suppose we want to turn on a specific sprite without changing any of the others. We can use a variation of the Peek and Poke statement above, only this time using the Boolean OR function to selectively set a bit: POKE V+21,(PEEK(V+21) OR 2↑S). Again, S is a value between 0 and 7 that represents the eight sprites. This Poke will turn on any of the eight sprites, and have no effect on the others. You could use these two Pokes as subroutines, which you would call to turn on and off any sprite.

BOOKS

Q *I'm new at this computer business, and while there are some terms that I use and understand, I must admit my ignorance on many others. My question: Can you recommend a good, comprehensive dictionary of computer terms?*

—MARV RUTISHAUSER
BROOKFIELD, WI

A One that I've found both invaluable and easy to use is the *Barnes & Noble Thesaurus of Computer Science* (its ISBN number is 0-06-463594-5). Not only is it full of just about every computer term you can imagine, it also contains hundreds of color illustrations. Best of all, it costs only $6.95.

Q *Are there any good books on programming sound and music from machine language on the C-128?*

—JEFF RAYSON
NEW ORLEANS, LA

A I just received a new volume from Tab Books that covers the topic quite well. It's called *Advanced Commodore 128 Graphics and Sound Programming* ($15.95, ISBN 0-8306-8630-4). Besides sound, it also discusses programming 80-Column graphics and contains listings for several powerful sound and graphics programs.

Do you have a problem or question about your Commodore computer system, software or programming? Send your questions to:

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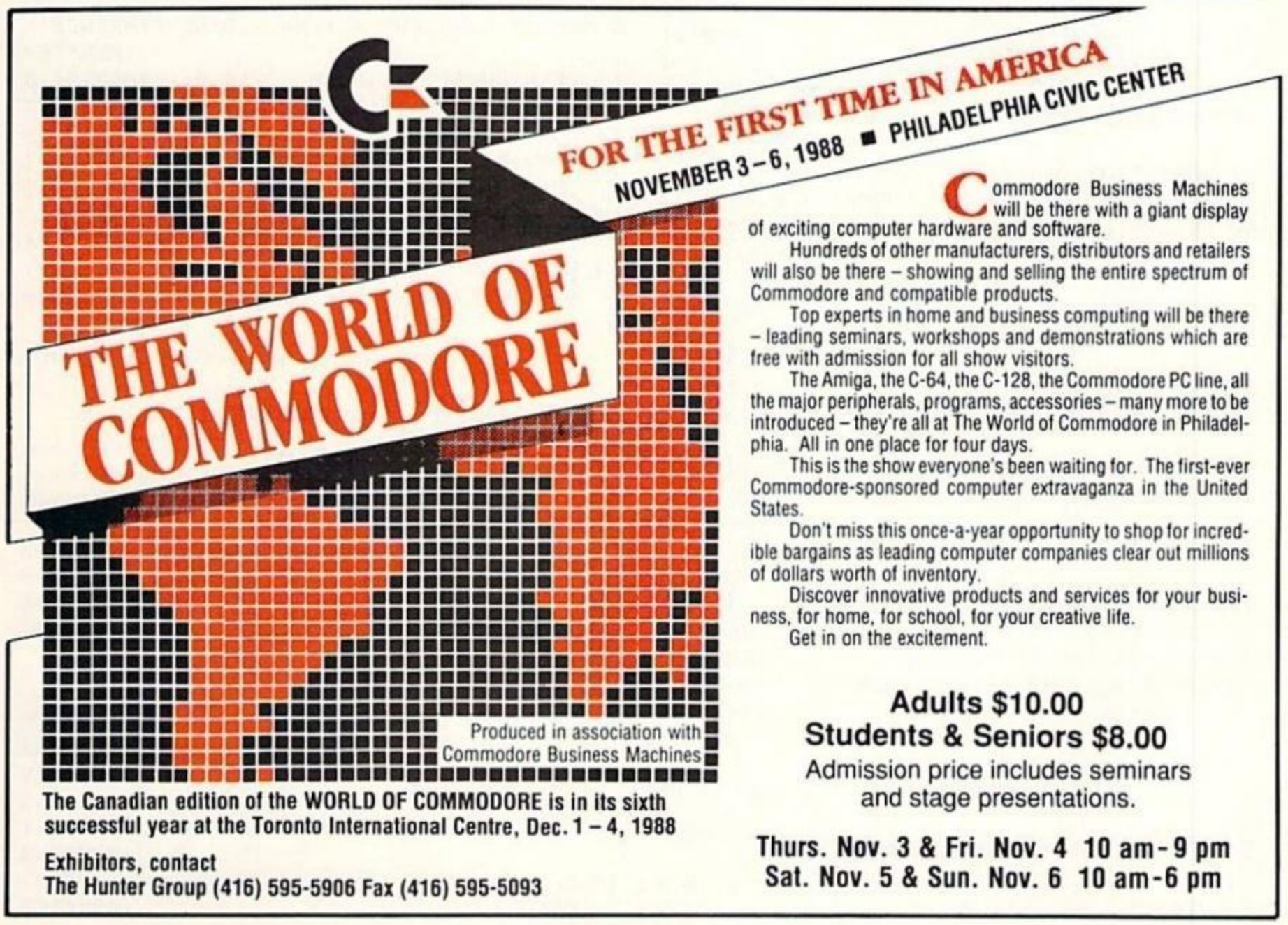
RUN Magazine
80 Elm St.
Peterborough, NH 03458.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1571 and 1581 drives easily accessible, take a spray extension tube (found on cans of lubricants and cleaners) and cut a piece off about ½ to ¾ of an inch long.

Slip the tubing securely over the left DIP switch. Now you simply lift the piece of tubing up for setting the drive to device 8, or press it down to configure the drive as device 9. And you'll never have to disconnect cables, turn the drive around and find a pen just to change device numbers. Plus, since the tubing is firm but flexible, you'll never damage the DIP switches from excessive pressure.

—MARTIN ZINAICH, PLANT CITY, FL

$4D7 RESCUE RUN 64

Accurately dropping supply packages onto a target from a fast-moving airplane requires quick reactions and a steady hand. This program, Rescue RUN 64, has an airplane flying across the screen at randomly chosen altitudes. On each pass, you get one chance to release a package on a ground-based target by pressing any key. Hitting the target wins you 25 points; a bull's-eye is worth 50. Bombs away!

```
Ø REM 64 RESCUE RUN - JOE CHARNETSKI
                                        :REM*1Ø2
1Ø R=54272:FORI=R TO R+23:POKEI,Ø:NEXT:POK
   EI,15:POKE R+5,5:POKE5328Ø,2    :REM*198
2Ø POKE53281,Ø:N=INT(RND(.)*12+1):TC=56267
   +N:TL=1995+N:BT=TL-38:Y=N+3:POKE646,N
                                        :REM*219
3Ø PRINT"{SHFT CLR}{CTRL 9}"SPC(17)RIGHT$(
   "ØØØØØ"+MID$(STR$(S),2),5):POKE R+1,23:
   POKE R+4,2Ø                          :REM*185
4Ø IFS<ATHENPOKE R+4,23:S=S+5:GOTO3Ø
                                        :REM*14
5Ø FORJ=1TO3:POKETC+J,N+2+(JAND1):POKETL+J
   ,16Ø:NEXT:POKE646,N+1:POKE198,Ø:REM*214
6Ø PRINT"{HOME}";:FORI=1TOY:PRINT:NEXT:PRI
   NTTAB(X)" {CRSR DN}{CRSR LF} {CRSR UP}{
   CTRL 9}{COMD *}{CRSR DN}{CRSR LF} {SHFT
    *} {COMD *}":IFK$=""THENGETK$ :REM*139
7Ø IFK$<>""THENIFD<6THENC=X+3:D=D+1
                                        :REM*214
8Ø IFD>1THENPOKE B,32:V=V+1          :REM*13
9Ø IFCTHENB=C+1Ø24+(V+Y+2)*4Ø:POKEB,98
                                        :REM*81
1ØØ IFB>BT-2ANDB<BT+2THENA=S+5Ø+(B<>BT)*25
    :K$="":B=Ø:C=Ø:D=Ø:V=Ø:X=Ø:GOTO2Ø
                                        :REM*235
11Ø X=X+1:IFX< 36 AND B <1984 GOTO 6Ø
                                        :REM*131
12Ø PRINT"{HOME}{2 CRSR DNs}{CTRL 2}"TAB(1
   3)"TRY AGAIN (Y/N)?"              :REM*183
13Ø GETA$:IFA$="Y"THENRUN            :REM*152
14Ø IFA$="N"THEN PRINT"{SHFT CLR}":POKE R+
   24,Ø:END                          :REM*37
15Ø GOTO13Ø                          :REM*216
```

—JOSEPH CHARNETSKI, DALLAS, PA

$4D8 CHARACTERS FROM THE CENTER

Having messages "grow" out from the center of the monitor screen is an eye-catching trick. Letter Extracter works in both 64 and 128 modes. Just assign a message to A$, and you can use it repeatedly in one program with a GOSUB 50000 command.

```
Ø REM 64/128 LETTER EXTRACTOR - BRIAN JAND
  ULA                                   :REM*242
1Ø PRINTCHR$(147):PRINT"{CTRL 2}"   :REM*63
2Ø A$="PRESS A KEY FOR ANOTHER MESSAGE!":G
   OSUB 5ØØØØ                           :REM*77
25 GET A$:IF A$=""THEN 25               :REM*9
3Ø A$="{6 SPACEs}HERE'S THE SECOND MESSAGE
   !{6 SPACEs}":GOSUB 5ØØØØ             :REM*22
35 REM REDEFINE A$ AS NECESSARY      :REM*166
4Ø PRINT:END                            :REM*183
5ØØØØ A=LEN(A$):IFA/2<>INT(A/2)THEN A$=A$+
      "{CTRL 9}"                        :REM*39
5ØØ1Ø FORI=1 TO A/2:PRINT"{HOME}"TAB(22-I)
      ;LEFT$(A$,I)RIGHT$(A$,I):PRINT"{2 CR
      SR DNs}"                          :REM*16Ø
5ØØ15 FORH=1TO4Ø:NEXT:NEXT:RETURN :REM*213
```

—BRIAN K. JANDULA, ANTIOCH, IL

$4D9 C-64 AUTUMN LETTERS ARE A-FALLIN'

Alpha Autumn 64 makes autumn leaves in all their colors fall down your screen in the shape of letters. The value of A gives the letters an unusual twirling effect.

```
Ø REM IN TIME FOR AUTUMN - BILL LAWRENCE
                                        :REM*167
1Ø PRINTCHR$(147):POKE 5328Ø,Ø:POKE53281,Ø
   :A=66:B=32:R1=1Ø31:R2=1471       :REM*197
2Ø FORL=1TO26:C=INT(RND(Ø)*4+7)     :REM*66
3Ø FORI=R1 TO R2STEP4Ø:POKEI,L:POKE54272+I
   ,C:FORJ=1TO5Ø:NEXT                   :REM*16Ø
4Ø POKEI,A:FORJ=1TO5Ø:NEXT:POKEI,B:NEXT
                                        :REM*98
5Ø POKER2,L:POKE54272+R2,C:R1=R1+1:R2=R2+1
   :NEXT:FORJ=1TO15ØØ:NEXT              :REM*8
```

—BILL LAWRENCE, WINNEPEG, MANITOBA, CANADA

$4DA DON'T FORGET THE 1902A!

Color Cornucopia (*RUN*, July 1988) showed C-128 owners how to squeeze hundreds of colors out of their 80-column video monitors. Unfortunately, the program has practically no effect on the Commodore 1902A's 80-column screen.

But don't despair. My program uses the C-128's 40-Column mode to squeeze some colors out of the 1902A in Multicolor mode. By drawing series of closely knit, multicolored lines, you can get some unusual colors. For reference, the standard 16 colors are drawn at the top of the screen.

Now, if I could just find a use for these. . . .

```
Ø REM EXTRA C-128 4Ø-COLUMN COLORS - ROBER
  T MORTON                              :REM*23Ø
1Ø GRAPHIC 3,1                          :REM*148
2Ø COLOR Ø,1:COLOR4,1                   :REM*185
3Ø T=T+1:IFT=16GOTO1ØØ:COLOR1,T:COLOR2,T+1
                                        :REM*174
4Ø C=Ø:FORX=ØTO16ØSTEP1Ø:C=C+1:IFC<16THEN
   COLOR3,C                             :REM*168
```


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```
5Ø BOX 3,X,Ø,X+1Ø,2Ø,Ø,1                    :REM*75
6Ø NEXT                                      :REM*19Ø
7Ø FORX=Ø TO 16ØSTEP2:DRAW1,X,2Ø TO X,199
                                             :REM*2Ø5
8Ø DRAW 2,X+1,2Ø TOX+1,199:NEXT:SCNCLR
                                             :REM*17Ø
9Ø GOTO 3Ø                                   :REM*216
1ØØ END                                     :REM*228
```

—Robert Morton, Denton, MD

$4DB C-128/1571 GO64 Safeguard

After using the C-128's GO64 command with a 1571 drive, the drive is still in 1571 mode, even though the computer is in 64 mode. Therefore, it's a good idea to issue the following command after the GO64 command to set things straight:

```
OPEN 15,8,15,"UJ":CLOSE 15
```

Now you can safely load most copy-protected software and programs such as your QuantumLink terminal package.

—Robert V. Taylor, Little Rock, AR

$4DC Unrestricted Fraction Conversion

Here's a 64- and 128-mode program that converts any decimal number into a common fraction in lowest terms. The resulting fraction is the precise equivalent in the case of a terminating decimal, and is very accurate, although, of course, not exact, when the decimal number is periodic or irrational. It is more powerful than Magic Trick $3FD (*RUN*, July 1987), which converts only terminating numbers.

Just type it in, using *RUN*'s Checksum, and then run it in either 64 or 128 mode. The accuracy in non-terminating cases can be enhanced by substituting other values for E in line 10. Programmers will undoubtedly find uses for this routine in any programs that display decimal results.

```
Ø REM C-128/C-64 FRACTION CONVERSION - DAN
  ILO R. VELIS                               :REM*21
1Ø E=1E-8:J=2:DIME(16),R(16):INPUT"{CRSR D
  N}NUMBER";N$:T=LEN(N$)                     :REM*16Ø
2Ø I=I+1:C$=MID$(N$,I,1):IFC$<>"."ANDI<TTH
  ENB$=B$+C$:GOTO2Ø                          :REM*46
3Ø T=T-I:T=VAL("."+RIGHT$(N$,T)):U=T
                                             :REM*1Ø1
4Ø IFT=ØTHENB$=B$+C$:GOTO1ØØ                 :REM*1Ø7
5Ø T=1/T:E(J)=INT(T):T=T-E(J):R(J)=E(J):R(
  J+1)=1                                     :REM*161
6Ø FORI=1TOJ-2                               :REM*89
7Ø R(J-I)=E(J-I)*R(J-I+1)+R(J-I+2):NEXT
                                             :REM*174
8Ø IFABS(R(3)/R(2)-U)>EANDJ<15THENJ=J+1:GO
  TO5Ø                                       :REM*49
9Ø A$=STR$(R(2)):B$=B$+STR$(R(3))+"/"+RIGH
  T$(A$,LEN(A$)-1)                           :REM*242
1ØØ PRINT"THE FRACTION IS "B$:RUN            :REM*21
```

—Danilo R. Velis, Buenos Aires, Argentina

$4DD Line-by-Line Clearing on the C-64

Anyone who writes programs on the C-64 has probably at some time needed to erase part of the screen, while leaving the remainder intact. There are several ways to do this, such as holding down the space bar or the delete key.

C-64 Line Eraser gives you a much faster and easier way. Just type in this program, save it, then run it. After it's activated, you won't even know it's present until you want to delete a line. To do so, position the cursor on the line, press the F1 key and—zap!—no more line. The program from which you deleted the line is unaffected, and the line is still in the program and in memory, in case you decide you want it back.

```
Ø REM 64 LINE ERASER - MARC TEMANSON
                                             :REM*254
1Ø FORX=49152 TO 49193:READS:POKEX,S:NEXT:
  SYS49152:NEW                               :REM*6
2Ø DATA 12Ø,169,192,141,21,3,169,13,141,2Ø
  ,3,88,96,165,2Ø7,2Ø1,Ø,24Ø                 :REM*248
3Ø DATA 3,76,49,234,165,2Ø3,2Ø1,4,24Ø,3,76
  ,49,234,166,214,142,13,3                   :REM*189
4Ø DATA 32,255,233,76,49,234                 :REM*224
```

—Marc Temanson, Peabody, KS

$4DE Getting Out of C-128 Windows

Although long-time C-128 users eventually learn how to escape a window on the C-128's 40- and 80-Column modes without pressing run-stop/restore, most new C-128 users don't yet know how. Pressing run-stop/restore will exit the window, but it will also clear the screen and possibly disable any interrupt-driven utilities you may have active.

For those wondering how to properly exit a window, just press the home key twice in Direct mode, or, in a program, enter PRINT"{2 HOMES}", which will accomplish the same thing.

—Rick Sprague, Gladwin, MI

$4DF More Safe Window Exits

Pressing the home key twice to exit a window causes the C-128 to reset all line links. Once they're reset, lines that wrap around to form two or more lines are interpreted as individual lines. Therefore, never edit program lines already displayed on the screen after exiting a window in this manner. Rather, clear the screen and display a fresh listing.

—Douglas Johnson, Largo, FL

$4E0 Another Use for REM Statements

When debugging or testing a new program, you'll find that deleting a line or group of lines comes in handy in many situations. However, instead of deleting the line(s), try inserting a REM statement at the beginning thereof. Use the shifted insert-delete key to insert four spaces at the beginning of the line between the line number and the first statement. Here's an example:

```
10 POKE 53280,0:POKE 53281,0:PRINT CHR$(147)
```

and after inserting the REM:

```
10 REM POKE 53280,0:POKE 53281,0:PRINT CHR$(147)
```

Later, after testing the program, you'll probably want to restore the lines to their original syntax, so list them and remove the REM statement. You'll soon find that this process is one of the handiest uses for the REM statement.

—Tony Patton, Louisville, KY ►

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$4E1 Fancy Character Printing

If you're writing a program and need to print text to the screen at some point, don't use a standard Print statement. Instead, spice up your program with my fancy print routine, Comet-Like Cursor. It earned its name because it makes the cursor move across the screen while leaving a trail of user-defined letters contained in the variable A$.

```
Ø REM COMET-LIKE CHARACTERS - HELEN ROTH
                                        :REM*252
1Ø A$="THIS CAN BE ANY MESSAGE DESIRED"
                                        :REM*185
2Ø FOR I=1 TO LEN(A$)                   :REM*212
3Ø PRINTMID$(A$,I,1)"{CTRL 9} {CTRL Ø}{CRS
   R LF}";                              :REM*122
4Ø FOR J=1 TO 5Ø:NEXT:NEXT:PRINT" ":REM*7Ø
```

—Helen Roth, Los Angeles, CA ■

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Use your joystick as you would a mouse for pointing and selecting.

Joystick Mouse Emulator

With a joystick in port 2, Joystick Mouse Emulator moves a pointer about the screen much as does a mouse input device. Type in Listing 1 (Joystick Pointer) and Listing 2 (Mouse Emulation Demonstration), using *RUN*'s Checksum program to trap your mistakes, and save them to disk.

Plug a joystick into port 2 after you turn off your computer, power up again, and load and run Listing 1, then load and run Listing 2. Listing 2 lists some typical commands on the screen, along with the pointer, calls the machine language routine and waits for the joystick to move the pointer. A formula computes the pointer's screen location (1024–2023 in default) when you press the fire-button.

The pointer moves in the direction you press the joystick. When you move the tip of the pointer over a desired instruction, press the fire-button to get a message identifying your selection. For instance, if you move the pointer to the Print option and press the fire-button, the screen displays the message "You called for Print".

The data for the sprite shape begins at the eighth data element in Listing 1 on line 220. Change this data to create other shapes. Data items 13 and 15 in line 200 change the speed at which the pointer moves; I used values that make it move at a reasonable speed.

You can use Joystick Pointer as a machine language subroutine in your own applications programs. Just use a Gosub command early in your own program to install the ML. Your programs will have to contain a series of If-Then statements, such as the demo program uses, to determine the action taken when you make a selection.

Of course, in using the joystick routine in your own applications, you must map out the format of your own on-screen instructions, commands, options, and so on. The formula in line 70 of the demo program returns the number of the screen cell that the pointer occupied when you pressed the fire-button, by reading the sprite horizontal and vertical registers for the pixel number of the line and column of the sprite. For instance, for a pointer in the upper-left corner of the screen, P = 1024, the first screen location in default memory.

To switch screen locations, adjust the formula by changing 1024 to the number of the first byte of screen memory that your program uses; the joystick routine still works.

—Kenny Lawson, Indianapolis, IN Ⓡ

Listing 1. Joystick Pointer program.

```
1Ø REM JOYSTICK POINTER - KENNY LAWSON
                                        :REM*2Ø4
2Ø FORX=68ØTO695:READA:POKEX,A:CT=CT+A:NEX
   T                                    :REM*123
3Ø FORX=4Ø96ØTO41311:READA:POKEX,A:CT=CT+A
   :NEXT                                :REM*4Ø
4Ø IFCT<>37849THENPRINT"{SHFT CLR}ERROR IN
    DATA STATEMENTS!":END               :REM*62
5Ø PRINTCHR$(147)"RUN LISTING 2 TO SEE MOU
   SE EMULATOR."                        :REM*184
6Ø DATA 165,1,41,254,133,1,32,Ø,16Ø,165,1,
   9,1,133,1,96,162,Ø,189,32,161    :REM*51
7Ø DATA 157,192,2,232,224,64,2Ø8,245,165,1
   7Ø,141,Ø,17Ø,169,11,141,248,7   :REM*181
8Ø DATA 169,1,141,21,2Ø8,169,Ø,141,16,2Ø8,
   141,27,2Ø8,141,31,2Ø8,141,39     :REM*97
9Ø DATA 2Ø8,169,24,141,Ø,2Ø8,169,5Ø,141,1,
   2Ø8,173,Ø,22Ø,133,17Ø,41,16     :REM*1Ø2
1ØØ DATA 2Ø8,6,173,Ø,17Ø,76,19,161,165,17Ø
    ,41,15,133,17Ø,169,15,56,229    :REM*9Ø
```

RUN it right: **C-64, joystick**

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```
11Ø DATA 17Ø,24Ø,228,2Ø1,1,2Ø8,6,32,235,16
    Ø,76,1,161,2Ø1,2,2Ø8,6,32,246 :REM*173
12Ø DATA 16Ø,76,1,161,2Ø1,4,2Ø8,6,32,175,1
    6Ø,76,1,161,2Ø1,8,2Ø8,6,32,2Ø5 :REM*94
13Ø DATA 16Ø,76,1,161,2Ø1,5,2Ø8,9,32,235,1
    6Ø,32,175,16Ø,76,1,161,2Ø1,9   :REM*62
14Ø DATA 2Ø8,9,32,235,16Ø,32,2Ø5,16Ø,76,1,
    161,2Ø1,6,2Ø8,9,32,246,16Ø,32 :REM*159
15Ø DATA 175,16Ø,76,1,161,2Ø1,1Ø,2Ø8,9,32,
    246,16Ø,32,2Ø5,16Ø,76,1,161,76:REM*225
16Ø DATA 52,16Ø,173,16,2Ø8,24Ø,14,173,Ø,2Ø
    8,2Ø8,16,2Ø6,16,2Ø8,169,255    :REM*189
17Ø DATA 141,Ø,2Ø8,96,173,Ø,2Ø8,2Ø1,24,24Ø
    ,3,2Ø6,Ø,2Ø8,96,173,16,2Ø8,24Ø:REM*171
18Ø DATA 11,173,Ø,2Ø8,2Ø1,82,24Ø,3,238,Ø,2
    Ø8,96,173,Ø,2Ø8,2Ø1,255,2Ø8     :REM*2Ø
19Ø DATA 245,238,Ø,2Ø8,238,16,2Ø8,96,173,1
    ,2Ø8,2Ø1,5Ø,24Ø,3,2Ø6,1,2Ø8,96 :REM*12
2ØØ DATA 173,1,2Ø8,2Ø1,245,24Ø,3,238,1,2Ø8
    ,96,162,16,16Ø,1ØØ,136,2Ø8,253 :REM*89
21Ø DATA 2Ø2,2Ø8,248,169,Ø,141,31,2Ø8,76,5
    2,16Ø,174,31,2Ø8,24Ø,243,133    :REM*11
22Ø DATA 17Ø,169,Ø,141,21,2Ø8,96,24Ø,Ø,Ø,1
    92,Ø,Ø,16Ø,Ø,Ø,144,Ø,Ø,8,Ø,Ø,Ø:REM*1Ø9
23Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø :REM*74
24Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
                                    :REM*39
```

Listing 2. Mouse Emulation Demonstration program.

```
1Ø REM MOUSE EMULATION DEMONSTRATION - KEN
   NY LAWSON                        :REM*1
2Ø A$="{5 SPACEs}":B$=A$+"{2 SPACEs}":FORX
   =1TO15:AN$=AN$+CHR$(17):NEXT:AN$=CHR$(1
   9)+AN$                           :REM*74
3Ø PRINTCHR$(147);:PRINT"FILE"B$"COPY"B$"C
   UT"B$"PASTE":PRINT               :REM*1Ø8
4Ø PRINT"DISK"B$"VIEW"B$"HELP"B$"PRINT":FO
   RX=1TO21:PRINT:NEXT              :REM*121
5Ø PRINT"TRANSFER"A$"DATA"A$"TIME"A$"QUIT"
   CHR$(19)                         :REM*25
6Ø C$="":SYS68Ø                     :REM*74
7Ø P=1Ø24+(INT((PEEK(53249)-5Ø)/8)*4Ø)+(IN
   T((PEEK(53248)+256*PEEK(53264))/8)-3)
                                    :REM*82
8Ø IFP<1Ø27THENC$="FILE"            :REM*236
9Ø IFP>1Ø34ANDP<1Ø39THENC$="COPY"   :REM*51
1ØØ IFP>1Ø45ANDP<1Ø49THENC$="CUT"   :REM*17
11Ø IFP>1Ø56ANDP<1Ø61THENC$="PASTE"
                                    :REM*253
12Ø IFP>11Ø3ANDP<11Ø8THENC$="DISK":REM*184
13Ø IFP>1114ANDP<1119THENC$="VIEW"  :REM*Ø
14Ø IFP>1125ANDP<113ØTHENC$="HELP":REM*194
15Ø IFP>1136ANDP<1142THENC$="PRINT":REM*71
16Ø IFP>1983ANDP<1992THENC$="TRANSFER"
                                    :REM*2Ø
17Ø IFP>1996ANDP<2ØØ1THENC$="DATA":REM*245
18Ø IFP>2ØØ5ANDP<2Ø1ØTHENC$="TIME":REM*167
19Ø IFP>2Ø15ANDP<2Ø19THENC$="QUIT" :REM*21
2ØØ PRINTAN$"YOU CALLED FOR{9 SPACEs}{8 CR
    SR LFs}"C$:IFC$<>"QUIT"THEN6Ø:REM*18Ø■
```

RUN's Checksum

TYPE IN *RUN*'s CHECKSUM, which serves for both the C-64 and for the C-128 in either 40- or 80-Column mode, and save it to disk before running. When typing in a program from *RUN*, first load and run *RUN*'s Checksum. The screen will display a SYS number that deactivates and reactivates the Checksum. Always disable *RUN*'s Checksum before attempting to run another program. Note: You can abbreviate Basic keywords; spaces affect the checksum only when within quotes; and the order of characters affects the checksum.

With this new version, when you press return after typing in a program line, a one-, two-, or three-digit number from 0 to 255 appears in the home position. If this number matches the checksum value in the program listing, the line is correct. If the number that appears *doesn't* match the checksum value, compare the line with the magazine listing to find your error. Then move the cursor back up to the line and make your corrections. Now, after you press return, the correct checksum value should appear. Continue entering the listing until all the lines have been correctly typed. Then deactivate *RUN*'s Checksum, using the SYS number. Save the finished program.

All the graphics and control characters in the listings in *RUN* have been translated into understandable key combinations. They are the instructions you see inside the curly braces. For example, {SHIFT L} means you hold down the shift key while you press the L key. You do *not* type in the curly braces. What appears on the screen will look quite different from what is designated inside the braces. Here are some more examples:

{22 SPACEs}—press the space bar 22 times

{SHIFT CLR}—hold down the shift key and press the clr-home key

{2 CRSR DNs}—press the cursor-down key twice

{CTRL 1}—hold down the control key and press the 1 key

{COMD T}—hold down the Commodore logo key and press the T key

{FUNCT 1}—press the F1 key

{5 LB.s}—press the British pound key (*not* #) five times R

Listing 1. *RUN*'s Checksum program. This program is available on *RUN*'s BBS for users to download.

```
1Ø REM RUN'S CHECKSUM 64/128 - BOB KODADEK
2Ø MO=128:SA=3328:IF PEEK(4Ø96Ø)THEN MO=64:SA=4
   9152
3Ø FOR I=ØTO169:READB:CK=CK+B:POKE SA+I,B:NEXT
4Ø IFCK<>2Ø651 THENPRINT"DATA ERROR!":END
5Ø POKESA+11Ø,24Ø:POKESA+111,38:POKESA+14Ø,234
6Ø PRINTCHR$(147)STR$(MO)" RUN CHECKSUM":PRINT
7Ø PRINT"TO TOGGLE ON OR OFF, SYS"SA:IF MO=128
   THEN 1ØØ
8Ø POKESA+13,124:POKESA+15,165:POKESA+25,124:PO
   KESA+26,165
9Ø POKESA+39,2Ø:POKESA+41,21:POKESA+123,2Ø5:POK
   ESA+124,189
1ØØ POKESA+4,INT(SA/256):SYS SA:NEW
11Ø DATA 12Ø,162,24,16Ø,13,173,4,3,2Ø1,24,2Ø8,4
    ,162,13,16Ø,67,142,4,3,14Ø
12Ø DATA 5,3,88,96,32,13,67,152,72,169,Ø,141,Ø,
    255,133,176,133,18Ø,166,22
13Ø DATA 164,23,134,167,132,168,17Ø,189,Ø,2,24Ø
    ,58,2Ø1,48,144,7,2Ø1,58,176
14Ø DATA 3,232,2Ø8,24Ø,189,Ø,2,24Ø,42,2Ø1,32,2Ø
    8,4,164,18Ø,24Ø,31,2Ø1,34
15Ø DATA 2Ø8,6,165,18Ø,73,1,133,18Ø,23Ø,176,164
    ,176,165,167,24,125,Ø,2,133
16Ø DATA 167,165,168,1Ø5,Ø,133,168,136,2Ø8,239,
    232,2Ø8,2Ø9,169,42,32,21Ø
17Ø DATA 255,165,167,69,168,17Ø,169,Ø,32,5Ø,142
    ,169,32,32,21Ø,255,32,21Ø
18Ø DATA 255,169,13,32,21Ø,255,1Ø4,168,96,1Ø4,1
    7Ø,24,32,24Ø,255,1Ø4,168
19Ø DATA 96,56,32,24Ø,255,138,72,152,72,24,162,
    Ø,16Ø,Ø,32,24Ø,255,169
2ØØ DATA 42,2Ø8,198                 ■
```


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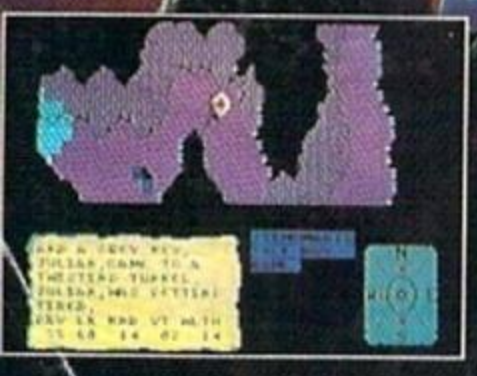

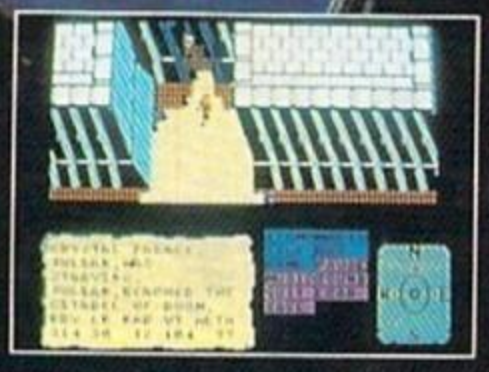

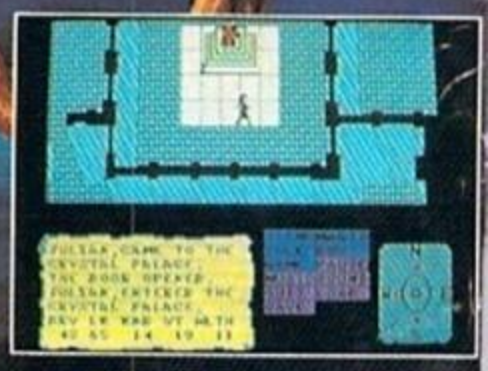

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